

**Attachment J-1**  
**Statement of Work**  
**For**  
**International Space Station**  
**Program Integration and Control Contract**

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## **1.0 MANAGEMENT INTEGRATION AND CONTROL**

The Program Integration and Control (PI&C) contractor shall provide all necessary program, business management, engineering, technical, administrative skills to accomplish the objectives and outcomes described within this contract. The contractor shall perform the services and deliver the products described in this Statement of Work (SOW), contract terms and conditions, applicable documents, Data Requirements Descriptions (DRDs), and other plans and sections contained within this contract. These products and services will be in direct support of the International Space Station Program (ISSP) to manage and integrate the implementing organizations (NASA Center institutions, other contractors, and International Partners/Participants) and ISSP customers. This includes the continued development, maintenance, and implementation of top-level research and development (R&D) requirements, which flow to the implementing organizations to enable the continued operation and utilization of the ISS R&D facility.

### **1.1 PROGRAM MANAGEMENT**

#### **1.1.1 Program Management and Administration**

- (a) The contractor shall accomplish program management and administration, including risk management, in order to develop and deliver the required ISSP products and services as defined for this contract.
- (b) The contractor shall develop and maintain program management systems, as outlined below, for the planning, organization, control, and reporting of all activities required by this contract.

These products and services will include the development and operation of systems necessary for providing assessments and analysis for the overall R&D, integration, and status (e.g., cost, technical, and schedules for the ISSP) and for providing inputs to the ISSP for overall strategic planning, policy and risk management of the ISSP and its R&D of experiments and projects to facilitate the ISSP in accomplishing its mission.

These systems will assure accomplishment of all outcomes and deliverable products required by this contract.

##### **1.1.1.1 Planning and Reviews**

###### **1.1.1.1.1 PI&C Plans**

- (a) The contractor shall develop, maintain, and implement a PI&C Management Plan in accordance with DRD A-PM-01.
- (b) The contractor shall provide a PI&C Closeout Plan in accordance with DRD A-PR-02

#### 1.1.1.1.2 Performance Management Reviews (PMRs)

- (a) The contractor shall support monthly and quarterly Performance Management Reviews (PMRs) with NASA.
- (b) The contractor shall provide, in the PMRs, insight into the contractors', subcontractors', and vendors' overall technical, schedule and cost performance and status to the ISSP.
- (c) The contractor shall present at the PMRs metrics that effectively indicate the level of success in the execution of contract requirements and the status of the contractor's achievement against the performance standards contained within this statement of work or elsewhere in this contract.
- (d) The contractor shall depict in PMR presentations a correlation of the metrics to the requirements, and measurements of contractor management responsiveness to the performance indicated by the metrics.
- (e) The contractor shall depict in PMR presentations performance measurement, accomplishments, issues and corrective actions, company financial status, including rates and any other data necessary to status the ISSP.
- (f) The contractor shall provide Integrated Management Review Products (IMRP) in accordance with DRD A-PM-02 for the work performed on this contract, and present the data in the PMR.

#### 1.1.1.1.3 Management Information System (MIS) Data Requirements

ISSP MIS is a web-based data repository designed to keep ISSP management and personnel aware of the most current ISSP technical, financial, workforce, schedules, and operational information, including issues and risks. MIS links ISSP core business issues and goals with the technical aspects of the ISSP. To accomplish this, ISSP managers will identify contractor provided financial planning, costs, workforce data, schedules, metrics, technical performance, and other contractor provided information to be linked to the MIS. The contractor provided information will be a subset of data that is required by the PI&C contract in existing DRDs. NASA will identify the DRD data to be linked to the MIS. The contractor shall implement mechanisms for linking this data to the MIS; identify and implement changes to the DRDs with contractor defined formats; provide compatibility to the MIS; and maintain the DRDs electronically in such a manner as to support electronic linkage to the MIS.

#### 1.1.1.1.4 PI&C Certification of Flight Readiness

The contractor shall develop, update and implement a PI&C Certification of Flight Readiness (CoFR) Plan per DRD A-PM-03 in accordance with SSP 50108, Certification of Flight Readiness Process Document for ISS. The contractor shall develop and implement an auditable approach to verify and ensure that flight preparation responsibilities and requirements are met and all issues dispositioned.

### **1.1.2 Internal/External Program Review Support**

(a) The contractor shall develop briefing materials and analyses for ISSP presentations and meetings with various internal and external review groups. These groups include the Aerospace Safety Advisory Panel (ASAP), Space Station Utilization Advisory Subcommittee (SSUAS), Stafford/Anfimov committee, Inspector General/General Accounting Office (IG/GAO), Space Flight Advisory Committee (SFAC), ISS Management and Cost Evaluation/NASA Advisory Council (IMCE/NAC), Independent Implementation Review (IIR), and Cost Assessments Teams.

(b) The contractor shall prepare and present various topics, such as ISSP technical, cost, and schedule status, specific safety or risk issues, and responses to external inquiries.

## **1.2 BUSINESS MANAGEMENT**

### **1.2.1 RESERVED**

### **1.2.2 RESERVED**

### **1.2.3 Resource Management**

As part of the program management for this contract, including risk management, the contractor shall perform the following tasks in support of resources management:

#### **1.2.3.1 Financial Management**

(a) The contractor shall develop, implement, maintain, and update a contract financial system which tracks resources by fund source, contract Work Breakdown Structure (WBS) and elements of cost including, but not limited to, labor, overhead, other direct cost, (e.g. travel and subcontracts) and indirect cost.

(b) The contractor's financial planning system shall support the Government budget process (e.g. Program Operating Plan (POP) budget calls), and to support special requests for budget impacts. NASA will, in accordance with the budget or special request guidelines and reporting format, specify the format and content of the contractor's inputs and supporting rationale.

(c) The contractor shall provide financial reporting in accordance with DRD A-PC-01.

#### **1.2.3.2 Performance Management**

1.2.3.2.1 The contractor shall develop, implement and maintain a Performance Measurement System (PMS) that provides management visibility into all aspects of contractor, interdivisional, subcontractor and vendor activities and integrates with other required management systems and reporting requirements.

1.2.3.2.2 The contractor shall provide Cost Performance Reports (CPRs) in accordance with DRDs A-PC-02 and A-PC-05.

1.2.3.2.3 The contractor shall report performance measurement on subcontracts that, based on risk, schedule criticality, or dollar value, have the potential to impact the successful fulfillment of this contract.

1.2.3.2.4 The contractor shall provide a summary of the PMS report in the monthly PMR. The contractor shall provide technical issues, accomplishments, analysis of cost and schedule performance, and corrective actions in problem areas within this report.

### **1.2.3.3 Organizational Management**

The contractor shall develop and provide Organizational/Workforce Reports in accordance with DRD A-PC-03.

### **1.2.3.4 PI&C Contract Work Breakdown Structure (WBS)**

The contractor shall develop and provide a contract PI&C Work Breakdown Structure (WBS) and Dictionary in accordance with DRD A-PC-04. The WBS and Dictionary shall indicate the mapping of the contractor WBS to the contract SOW WBS and SSP 50659, ISS WBS at the lowest levels of the ISSP WBS.

## **1.2.4 ISSP Budget Support / Assessments (LOE)**

### **1.2.4.1 ISSP Budget Database Support**

The contractor shall utilize the Space Program Integrated Contract Environment (SPICE) and the Integrated Financial Management (IFM) databases to accomplish the following:

(a) The contractor shall maintain the ISSP budget database to include tracking of all approved changes

(b) The contractor shall answer queries from CO, NASA business managers and resource analysts and provide reports.

### **1.2.4.2 ISSP Reserves/Changes Management Database Support**

The contractor shall use the SPICE, the IFM, and the Integrated Risk Management Application (IRMA) database to accomplish the following:

(a) The contractor shall maintain the data in the ISSP Reserves/Changes Management database to include tracking of all changes,

(b) The contractor shall answer queries from NASA business managers and Resource analysts and provide reports.

#### **1.2.4.3 Assessments**

The contractor shall support the ISSP Assessments and Cost Estimating Office (ACEO) in identifying, evaluating, analyzing, tracking, and reporting planning and assessment issues and risks along with providing recommendations to the ISSP managers. The contractor shall coordinate content and formats of all assessments and analyses with the ISSP prior to delivery of all final products.

- (a) The contractor shall support the ACEO in integrating data from the ISSP's earned value and cost performance reports, including risks, to assess ISSP performance. These assessments will be used by the ACEO for the development of overall ISSP analyses and status.
- (b) The contractor shall support the ACEO in identifying, evaluating, and reporting risk issues in a monthly early warning report to the ISS Program Manager. This report provides detailed status of the ISSP's performance against the ISSP plan and impact of cost, schedule, and technical variances against the plan; and shall recommend actions to abate potential ISSP impacts.
- (c) Prior to the ISSP quarterly PMRs, the contractor shall support the ACEO in identifying, evaluating, and reporting a preview assessment of the ISSP status and technical health to the ACEO based on the assessment of the most current earned value, technical, cost, and schedule reports.
- (d) Upon completion of the quarterly PMRs, the contractor shall support the ACEO in providing an updated evaluation of the ISSP's status and technical health, based on the results of the data provided and presented as part of the quarterly PMR.
- (e) The contractor shall support the ACEO in performing Ad-hoc analyses and assessments including, but not limited to, parametric cost estimates, schedule, cost, requirements, and workforce correlations and analyses, life cycle cost (LCC) estimates, and trade studies.

#### **1.2.5 Program Scheduling**

The contractor shall provide overall ISSP schedule management and integration to support the continued development and operation of the ISS. Specifically, the contractor shall develop and maintain resource-loaded, logic-linked schedules as well as analyze and integrate schedules provided by other ISSP stakeholders and participants. Both top-level schedules (e.g., an overall Integrated Program Schedule – IPS) as well as lower-level schedules such as those needed by the International Partner (IP) Elements Integration and OA offices (CAMs) shall be developed and maintained. The contractor shall perform schedule analyses and report findings of those analyses at various levels of the ISSP. Operation of a scheduling system that supports overall ISSP objectives and requirements is also within the scope of the contractor. The contractor shall maintain and update the ISS Program Planning Calendar.

##### **1.2.5.1 Schedule Management**

(a) The contractor shall develop and provide PI&C schedules and schedule analysis for the ISSP.

(b) The contractor shall prepare and report program schedule metrics. (DRD A-PC-06)

(c) The contractor shall provide reporting and schedule analysis. (DRD A-PC-06)

#### 1.2.5.1.1 Integrated Program Schedule Management

The contractor shall integrate resource-loaded and critical path and external interface linked schedules from all ISSP contractors and performing organizations into a single master ISSP schedule.

(a) The contractor shall provide schedule development and analysis for all flights and program level activities.

(b) The contractor shall provide schedules updates and status reports for the entire effort of the ISSP. (DRD A-PC-06)

(c) The contractor shall provide critical path schedules, for the entire effort of the ISSP. (DRD A-PC-06)

(d) The contractor shall maintain and update schedules and Program Management Information on the ISSP Web site for the Integrated Program Schedule and the Key Program Performance Indicators (KPPIs) and schedules for the ONE NASA Management Information System (MIS). (DRD A-PC-06)

(e) The contractor shall research options for a web-based interactive access to the IPS and provide a report on the findings. In addition, the contractor shall develop and implement a process for interactive web updates for the Matrices.

1.2.5.1.2 The contractor shall provide deliverables to ISSP to meet the requirements as defined in DRD A-PC-06 for issue identification, schedule status analyses, and special agenda topics. The contractor shall provide these deliverables to the Integrated Program Schedule Panel (IPSP) in support of the ISSP.

#### 1.2.5.1.3 Program Level Schedule Data Management

The contractor shall lead the ISSP schedule data acquisition effort from all ISSP participants in order to acquire the data necessary to support the continued development, evolution, and monthly maintenance of the Integrated Program Schedule (Replacement CSD). Various ISS Program meetings are sources of information that support the effort described in schedule development, maintenance and analyses.

#### 1.2.5.2 Scheduling System Support

(a) The contractor shall operate a scheduling system identified in Appendix D, Table 1, in support of the ISSP.

(b) The contractor shall review other ISSP contractors' schedules to ensure compliance with Program requirements. After evaluation and receipt of suitable inputs from ISSP contractors and performing organizations, the contractor shall integrate schedule inputs into the IPS. The contractor shall work through the IPSP to identify and resolve schedule process and data issues.

#### **1.2.5.3 Team Schedule Support**

The contractor shall generate and maintain top level and lower level schedules and analyses for ISSP organizations and projects International Partner (IP) Elements, if requested by customer. As necessary, the contractor shall develop additional schedule management tools/products. (DRD A-PC-06)

(a) The contractor shall provide updates and status reports for tasks

(b) The contractor shall create hardware delivery matrices, delivery schedules and delivery burn-down charts, as required.

#### **1.2.5.4 Common Schedules Database (CSD) Archival Research Support**

The contractor shall research options to migrate legacy MSFC CSD data to JSC.

#### **1.2.5.5 ISSP Planning Calendar / Certification of Flight Readiness (CoFR) Review Meeting Matrix**

The contractor shall maintain the ISSP Planning Calendar and CoFR Meeting Matrix.

(a) The contractor shall participate in meetings to Program Calendar prepare updates. The contractor shall maintain the ISSP Planning Calendar on the ISSP Web site and provide updates twice weekly. The contractor shall also produce copies and deliver them to the customer in support of program office organizational staff meetings and the Integrated Program Schedule Panel. (DRD A-PC-06)

(b) The contractor shall provide maintenance of the CoFR Meeting Matrix by participating in meetings and providing updates and electronic status to Program participants of the CoFR matrix for baselines and working versions. (DRD A-PC-06)

#### **1.2.5.6 Schedule Risk Assessment**

The contractor shall perform independent assessments of hardware development and software schedules to identify ISSP critical path, performance to critical milestones and any schedule risks that are obvious and avoidable.

#### **1.2.5.7 Special Schedule Trade Studies**

At the written direction of NASA, the contractor shall perform Special Schedule Trade Studies in support of the ISSP.

#### **1.2.5.8 Integrated Schedule Analysis**

The contractor shall perform schedule analysis (on request), which can be integrated into the overall program assessment.

#### **1.2.5.9 Propose Alternate Report Formats**

The contractor will develop and propose alternate report formats for NASA review and concurrence.

#### **1.2.5.10 Incorporate Detail Project Schedules**

The contractor will collect and incorporate detailed project schedules into the IPS, with concurrence from NASA.

### **1.3 CONFIGURATION MANAGEMENT (CM) / DATA MANAGEMENT AND INTEGRATION (DMI)**

#### **1.3.1 Configuration Management**

The contractor shall develop, implement, and administer configuration management operations across the ISSP as specified in this contract and in accordance with SSP 41170, Configuration Management (CM) Requirements, SSP 50010, Documentation, Standards & Guidelines and SSP 50123-01, Configuration Management Handbook, and SSP 50172, Data Management Handbook. Additionally, the contractor shall be responsible for contract specific CM functions as described in each of the functional CM areas described below.

##### **1.3.1.1 Management and Administration**

The contractor shall provide for continued establishment and maintenance of the ISSP CM policies, procedures and requirements, including maintaining an infrastructure for the continued development and base lining of hardware, software, and other products under the ISSP control. The contractor shall provide book coordination functions for SSP 41170, SSP 50010, SSP 50123, and SSP 50172, which contain the ISSP CM/DMI requirements, policies, standards, and procedures.

1.3.1.1.1 The contractor shall develop and implement a CM Plan in accordance with DRD A-CM-01.

1.3.1.1.2 The contractor shall participate in Technical Interchange Meetings (TIMs) and ISSP Milestone Reviews by providing inputs regarding CM.

#### **1.3.1.2 Configuration Status Accounting (CSA) and Verification**

The contractor shall maintain Configuration Status Accounting requirements in accordance with SSP 41170 and assure the requirements and processes are implemented across the ISSP. The PI&C contractor shall perform the following CSA functions across the ISSP:

1.3.1.2.1 Participate in ISS hardware and software Functional Configuration Audits (FCA) and Physical Configuration Audits (PCA) by acting as the co-chair of the CM panel as defined in D684-10097-01, "Guidelines and Procedures for the conduct of Functional Configuration Audit (FCA) / Physical Configuration Audit (PCA)".

1.3.1.2.2 Participate in ISSP acceptance reviews and readiness reviews to ensure CM issues are addressed and dispositioned.

1.3.1.2.3 Conduct CM audits of other ISSP contracts to ensure compliance with CM requirements and processes pursuant to SSP 41170, SSP 50010, SSP 50123 and the CM Plan.

1.3.1.2.4 Audit and validate the data residing in the program status accounting systems (e.g., CSAS, SSAV, and COSMOS) to ensure accuracy and completeness.

1.3.1.2.5 Validate the ISS program baseline including the review and evaluation of changes to ensure proper baseline maintenance.

#### **1.3.1.3 Configuration Control**

The PI&C contractor shall perform the following Configuration Control activities across the ISSP:

1.3.1.3.1 Ensure execution of the Change Process in accordance with SSP 50123 and individual ISSP contractor Configuration Management plans.

1.3.1.3.2 Maintain all CM blank forms/templates required for change processing and maintain a quality control function to provide uniform change paper across the program.

1.3.1.3.3 Provide CM Secretariats for all ISSP Control Boards and Panels. CM Secretariat functions are to be performed in accordance with ISSP PPD 552, Space Station Control Board/Panel Operations Policy and SSP 50123.

1.3.1.3.4 Provide administrative support such as, but not limited to, meeting logistics, administration, agendas, action item management, minutes, and archival of all presentation material and decisional paper for all ISSP Configuration Control Boards and Panels, Acceptance Reviews, IP Assessment Reviews, and Certification of Flight Readiness (CoFR) reviews.

1.3.1.3.5 Conduct a program Joint Team Review (JTR), as described in SSP 50123-01, to screen all new change requests.

1.3.1.3.6 The contractor shall develop a Change Engineer (CE) Handbook in accordance with DRD A-CM-02.

The PI&C contractor shall perform the following Configuration Control activities for changes specific to the PI&C contract:

1.3.1.3.7 Process changes specific to the PI&C contract in accordance with SSP 50123. Review and evaluate ISSP changes originating from outside the PI&C contract to determine if those changes have potential impacts to the PI&C contract.

1.3.1.3.7.1 Maintain and process Program Directives (Management Directives, Joint Program Directives, and Partner Program Directives) in accordance with procedures established in SSP 50123.

1.3.1.3.8 Input, maintain, and validate the Configuration Status Management Operations System (COSMOS) database to assign Change Request (CR) numbers, track/status changes, and provide accurate information, reports, and monthly metrics.

**1.3.1.4 ( blank)**

#### **1.3.1.5 Software Configuration Management Requirements**

The contractor shall maintain the software configuration management requirements and assure the configuration identification, control, status accounting, and verification of software products and processes as specified in SSP 41170 are implemented across the ISSP.

#### **1.3.2 Program Data Management and Integration**

1.3.2.1 Programmatically, the contractor shall maintain and implement an AS9100 compliant data management system in accordance with SSP 50010 and SSP 41170, and assure the requirements and processes are implemented across the program. The contractor shall:

1.3.2.1.1 Update and maintain the SSP 50573, Program Documentation Tree.

1.3.2.1.2 Update and maintain the ISSP technical documentation baseline in PALS (or equivalent) and COSMOS.

1.3.2.1.3 Maintain the ISSP Master List of work instructions, processes, and procedures in accordance with AS9100, Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing.

1.3.2.1.4 Provide Data Requirement (DR) receipt, tracking, monitoring, reporting, validation, evaluation, distribution, status, and storage of ISSP contracts deliverables and IP/P data deliverables incoming to the ISSP as identified in the following Bilateral Data Exchange Agreements, Lists and Schedules (BDEALS) and Bilateral Hardware and Software Exchange Agreements, List, and Schedules (BHSEALS) documents: SSP 50124, NASA/CSA BDEALS; SSP 50126, NASA/NASDA BDEALS; SSP 50127, NASA/ESA BDEALS; SSP 50137, NASA/RSA BDEALS; SSP 50407, NASA/ESA BDEALS for Cupola 1; SSP 50611, NASA/ESA BDEALS for ATV; SSP 50614, NASA/HTV BDEALS for HTV; and SSP 50617, NASA/NASDA BDEALS for CAM; and ; SSP 50352, NASA/AEB BDEALS; and SSP 50648, NASA/AEB BHSEALS.

1.3.2.1.5 The PI&C contractor shall perform the following Data Management activities in accordance with SSP 41170, SSP 50010, and SSP 50172 specific to the PI&C contract: Manage and operate the International Partner library (IOMS or equivalent). Contents of the library shall include, but are not limited to, the following: translated Russian documents; Bilateral Data Exchange Agreements and Lists (BDEALS) data; NAS15-10110 Contract deliverables; Government Furnished Data (GFD) deliverables; IP protocols; IP safety data packages; hazard reports; drawings; film; videos; photos; faxes; and letters. The contractor shall be able to access and provide requested materials/information within two business days.

1.3.2.1.6 Provide an Engineering Release Unit (ERU) in accordance with SSP 50123 for release of ISSP baseline documentation.

1.3.2.1.7 Operate a Configuration Management Receipt Desk (CMRD) in accordance with SSP 50123.

1.3.2.1.8 Provide Document Quality Assurance (DQA) in accordance with SSP 50010 for all ISSP controlled documentation identified under this contract.

### **1.3.2.2 Program Technical Data Access**

(a) The contractor shall integrate and maintain the Orbital Replacement Unit (ORU) data and Flight Support Equipment (FSE) data (provided by Logistics & Maintenance and the hardware providers) in the Orbital Replacement Unit Data Directory (ORUDD) or equivalent. The ORUDD provides a user-friendly single access point for retrieving technical data regarding ORUs & FSEs. (Reference Orbital Replacement Unit Data Directory (ORUDD) Release 1.0.4 Requirements Document and ORUDD Release 1.0.4 Release Contents Document).

(b) The contractor shall develop an approach and plan in accordance with DRD A-DI-01 to expand the functionality of the ORUDD to provide a Program-wide single point access interface for the ISSP which will allow ISSP data users access to sources of existing technical ISSP data available in ISSP authorized repositories.

#### **1.3.2.2.1 Centralized Program Data Requirements**

The contractor shall develop and maintain Blank Books that centralize ISSP data requirements from each of the functional areas defined in the SSP 50200 series of documents (Volumes 1 – Volume 10). These Blank Books will provide specific data requirements, including data formats, attribute definitions, generic delivery templates and data flow processes. (Reference, as examples, SSP 50622-02, Mission Integration Data Set Blank Book and SSP 50622-03, Operations Data Set Blank Book. The contractor shall develop the Blank Books in accordance with SSP 41170 and SSP 50010. The contractor shall extract technical content for inclusion into the initial draft Blank Books from the appropriate SPIP Volumes (1-10) Appendix AA (SSP 50200 through 50200-10).

#### 1.3.2.2.2 Book Coordination

- (a) The contractor shall provide book coordination functions for Blank Books, to include the preparation, distribution and processing of Document Change Notices (DCNs).
- (b) The contractor shall provide book coordination functions for the following Bilateral Data Exchange Agreements, List, and Schedules (BDEALS) and Bilateral Hardware and Software Exchange Agreements, List, and Schedules (BHSEALS) documents, to include the preparation, distribution, and processing of Notification of Document Changes (NDCs): SSP 50124, SSP 50126, SSP 50127, SSP 50137, SSP 50407, SSP 60614, and SSP 50617, SSP 50352, and SSP 50648.
- (c) The contractor shall provide book coordination functions for SSP 50622-02 and SSP 50622-03 to include the preparation, distribution, and processing of Document Change Notices (DCNs).

1.3.2.2.3 The contractor shall respond to requests for resolving data workflow process issues that cross ISSP contractual interfaces and are impacts to work performance. Responding to and resolving request for issues with data work flow processes shall include:

- (a) Identification and documentation of the issue or problem
- (b) Investigation, analysis and documentation of the data workflow processes involved and the associated interfaces
- (c) Development of a resolution plan and schedule
- (d) Facilitation of the implementation of the proposed resolution
- (e) A three-month follow-up to verify resolution is working and provide rework as identified
- (f) Provision of closeout documentation addressing sub-paragraphs (a) thru (e).

#### 1.3.2.2.4 Support to ISSP Data Users

- (a) The contractor shall respond to and resolve inquiries regarding ISSP data.

(b) The contractor shall locate data, identify, and resolve data discrepancies and document data processes associated with ensuring accessibility to available technical ISSP data for all Program data users.

#### 1.3.2.2.5 Review of Change Request for Data

The contractor shall assess and concur on ISSP change requests (CRs) that contain requests for data in order to ensure no duplication and that delivery of the data is specified to a Program authorized repository.

### 1.4 PROGRAM INFORMATION TECHNOLOGY (IT)

The ISSP contract strategy decentralizes the implementation of IT except where program integration and control is necessary for appropriate program management and communication.

The contractor shall provide the IT infrastructure for use by ISSP participants to support the mission of the ISSP. The other contracts within the ISSP contract strategy will provide the IT necessary to perform the requirements as stated in their respective contracts; since their contract intent is to not specifically contract for generalized IT products and services. The other contractors may choose to utilize the ISSP IT infrastructure provided by the PI&C contract when common products and services provide for increase of supportability, promote commonality, or efficiencies. The contractor shall provide the IT necessary to meet the requirements, as defined in this contract, in accordance with SSP 50013, ISS Information Systems Plan.

#### 1.4.1 IT Management and Administration

Any of the existing ISSP IT tools defined in Appendix D, Table 1 are available as GFD and can be utilized by the contractor in fulfilling the contract requirements.

(a) The contractor shall employ a methodology which demonstrates consistency with the Software Engineering Institute (SEI) Level 3 Capability Maturity Model (CMM), or other comparable industry standard, to sustain any modifications to GFD tools. CMMI certification is not required.

(b) The contractor shall develop and maintain unique ISSP software tools and applications to support the continued development and operation of the ISSP, as defined in this contract.

1.4.1.1 The contractor shall report all IT delivered or direct costed to this contract by developing, maintaining and implementing the PI&C Information Technology (IT) Capital Investment Plan (CIP) and associated reports in accordance with SSP 50222, ISS Program Capital Investment Process (CIP).

The contractor shall gather fiscal information, and maintain an ISSP IT Capital Investment Plan and associated reports in accordance with the ISS IT Capital Investment Process.

1.4.1.2 The contractor shall develop, maintain and implement an IT Security Plan in accordance with NFS 1852.204-76. Upon approval, the IT Security Plan shall be incorporated into the contract as Attachment J-6.

1.4.1.3 The contractor shall develop, maintain and implement the IT Management Plan in accordance with DRD A-IT-01 for reportable IT. The IT Management Plan shall, at a minimum, address the following functions: system management and operations, including project management, configuration management, technology infusion, procurement, work authorization, and Metrics.

1.4.1.4 If the contractor implements Public Key Infrastructure system, the contractor system shall be interoperable with the NASA Public Key Infrastructure system.

1.4.1.5 The contractor shall develop and implement IT project plans in accordance with DRD A-IT-02 for the following activities:

- implementation of new hardware and software capabilities,
- conducting studies, market surveys, and system tests, and
- developing and supporting proposed system hardware relocation plans as required.

1.4.1.6 The contractor shall maintain an IT Performance Management and Capacity Plan in support of performance planning, analysis (e.g., log review, trend analysis, and system utilization), and design activities for new or modified systems capabilities; or for providing system and component-level capacity planning and monitoring to ensure adequate capacity and performance margins. The plan shall be prepared on a quarterly basis and include the following where applicable:

(a) By system, a summary of systems performance, including charts depicting observations for the current and previous 3 quarters, and a trend line reflecting anticipated performance for the coming 4 quarters. Performance will be quantified in terms of large and small transactions, as well as end-to-end transaction performance as measured from the end-user workstation to the host or data system.

(b) By system, a summary of resource utilization, including CPU, Disk, Memory, related Equipment (e.g., backup tape systems, off-line/near-line storage systems, physical storage space), and network bandwidth where applicable, with charts depicting observations for the current and previous 3 quarters and a trend line reflecting anticipated improvements or degradation during the coming 4 quarters.

(c) A discussion of the analysis and findings for any systems that have experienced significant performance anomalies or an increase or decrease in resource utilization relative to the previous month's baseline.

(d) Recommendations for improving any outstanding performance issues or capacity shortfalls.

(e) Recommendations for systems reconfiguration or consolidation that reduce operating costs or improve resource availability.

1.4.1.7 The contractor shall develop and implement an IT Technology Infusion Proposal Plan to propose new technology and service concepts for the Government's consideration. The proposal will give the government the ability to view the contractor(s) innovative ideas for solving the technical challenges outlined within this SOW and will address proposed skill mix and personnel.

#### 1.4.1.7.1 Concept

(a) The contractor shall assess the state of technology and the Program's requirements and infrastructure, and propose new technology and service concepts for the Government's consideration. In this assessment the contractor shall solicit inputs from customers/users. These proposed concepts may be driven by one or more of the following reasons:

- New customer requirements
- Upgrades to other systems that affect the primary systems functional capabilities, e.g., upgrades to a web browser not compatible with primary systems
- New product releases
- Complying with safety requirements
- New agency or center policies
- Conforming to current standards and formats
- Reducing operating costs
- Limited system enhancements to produce higher quality products
- System components become obsolete or non-repairable

(b) The contractor shall obtain approval for proposed concepts and associated estimated proposal costs prior to initiating a full technology infusion proposal effort.

(c) If the proposal is approved by the government, then an approved IT Project Plan, to be developed in accordance with A-IT-02, shall accomplish the implementation.

#### 1.4.1.7.2 Content

The proposals shall address at a minimum and as applicable:

- List price pages (catalog price)
- Description of proposed technology, including integration test results to date
- Contractor product identification number
- Model number
- GSA and commercial catalog unit number, if available
- Hardware and Software items to be replaced by the new technology product
- Changes/impacts to ISSP customers/users and other ISSP IT providers, and to NASA and Center(s) IT architectures and standards

- Changes to Agency or Center specific Strategic Plans
- Implementation plan and schedule
- System performance improvements as a benefit to the Government
- Known and anticipated impact on ISSP and non-ISSP contractors
- Proposed adjustment to transition charges
- Impacts on contractor performance
- Estimated return on investment.

#### **1.4.2 IT Systems Management and Operations**

(a) The contractor shall provide the ISSP customer community with full life cycle system support for ISSP IT systems, applications (e.g., web, mainframe, workstation, client/server, utility), platform systems, services, equipment, etc., as defined in Appendix E and Appendix F, Table 1, Table 2, and Table 3. The life cycle includes planning, requirements definition, design, programming, prototyping, testing, documentation, deployment, training, sustaining engineering and operations.

(b) The contractor shall provide a life cycle methodology consistent with Software Engineering Institute (SEI) Level 3 Capability Maturity Model (CMM), or other comparable industry standard. CMMI certification is not required.

(c) The contractor shall streamline the life cycle methodology to accommodate rapid development of new tools or updates to supported tools.

(d) The contractor shall address IT security in each phase of the life cycle.

(e) The contractor shall implement IT system performance standards in accordance with the requirements set forth in Appendix E.

(f) The contractor shall provide “book coordination” for SSP 50013 and SSP 50222.

(g) The contractor shall function as the property custodian for the government property assigned to this contract, identified in Appendix F, Table 3.

##### **1.4.2.1 IT Life Cycle Management**

The contractor shall manage designated production systems, ongoing and new projects, and functions and activities required to provide products and services to the ISSP customer community. The contractor shall adhere to policies and standards, and support information exchange and decision making forums. In support of this effort, the contractor shall provide the following activities.

1.4.2.1.1 The contractor shall assist the Government by reviewing Government-provided policies, architectures, standards, and procedures affecting this contract and recommending appropriate modifications and implementation strategies.

1.4.2.1.2 The contractor shall support key recurring Government-sponsored meetings, such as the ISD Configuration Board, the Chief Information Office's Network Access Control Board, Chief Information Officer's IT Steering Council and the ISS IT Working Group.

1.4.2.1.5 The contractor shall procure and deliver commercial off-the-shelf (COTS) software, hardware, and associated maintenance agreements as approved by the Government. The contractor shall provide all consumables used in operating the systems associated with this contract

1.4.2.1.6 The contractor shall develop, implement, and maintain IT Standard Operating Procedures in order to sustain products and services defined in this SOW. These procedures shall provide guidance for interfacing with other organizations and specific tasks required in the process of meeting customer requirements, and shall instruct technicians, production personnel, and other users in the proper setup and operations of systems. These procedures are not intended to document the details of how the tasks or interfaces are to be accomplished. These procedures shall:

- (a) Describe each system in terms of the requirements it fulfills, the equipment comprising the system, and any interconnection to other systems
- (b) Reference system engineering drawing numbers
- (c) Reference manufacturers' operations manuals
- (d) Give specific details on setup configurations related to the intended equipment functions
- (e) Give step-by-step system check instructions that, when performed, verify the system is functioning as designed
- (f) Give step-by-step instructions on how to operate the system equipment to achieve every stated purpose of the system, including references to manufacturers' manuals when appropriate
- (g) List the required customer interfacing tasks
- (h) List other procedures applicable to performing a specific system operation
- (i) Cross reference any corresponding Standard Operating Procedures
- (j) Reference preventive maintenance procedures

1.4.2.1.7 The contractor shall develop, implement, and maintain an IT Configuration Management Plan as defined below in order to maintain hardware and software specifications and baseline control of IT systems.

1.4.2.1.7.1 Concept

- (a) The contractor shall establish, implement, and comply with a stringent process of configuration management for all systems defined under this contract.
- (b) The contractor shall not change, modify, or relocate Government equipment or systems without prior approval unless otherwise stated in the configuration management plan.
- (c) The contractor shall provide, revise, and maintain a complete set of engineering and exhibit drawings, hardware and software configurations, and specifications and associated change documentation for all IT systems defined in this contract.
- (d) Where baseline configuration information does not exist, the contractor shall define the baseline.
- (e) The contractor shall provide current configuration documentation for all systems under this contract within 6 months after contract phase-in.

#### 1.4.2.1.7.2 Content

The IT Configuration Management Plan shall prescribe the process to be implemented for control of both engineering (design) configuration, and operational configuration. The IT Configuration Management Plan will include the following:

- Define how configuration control will be recorded and documented
- Identify the specific part of the organization responsible for maintaining the configuration control records
- Identify the documentation and data systems required to provide configuration control for both hardware and software
- Identify the specific equipment, systems, and operational interfaces which are subject to configuration control
- Describe the procedures to be used to coordinate, define, test, monitor, and control all technical and operational interfaces
- Identify individuals responsible for writing and for approving configuration control procedures, and
- Define how NASA will be involved with final decisions in the change process.

1.4.2.1.8 The contractor shall develop IT configuration reports that contain information and status on all equipment and software, which are maintained by and/or operated by the contractor. The information fields required for each category of equipment or software in the system shall include information on the category's description, location, user, manufacturer, external connections to other systems, maintenance support, and other fields normally contained in a IT configuration management system.

#### 1.4.2.1.10 IT Sustaining Engineering and Operation

The contractor shall provide sustaining engineering, including preventative maintenance, and operations for IT systems. At a minimum support will include the following activities.

1.4.2.1.10.1 The contractor shall provide sustaining engineering for multimedia, computer, and network systems defined in Appendix E and Appendix F, Table 1, Table 2, and Table 3. Sustaining engineering for applications shall include developing limited new capabilities, bug fixes, and coordination and testing support in response to new operating system and program product. For hardware systems and stand-alone equipment, sustaining engineering includes preventive and remedial maintenance, ordering of replacement parts, sparing, end-of life (EOL), and system software and firmware updates and patches.

1.4.2.1.10.2 The contractor shall manage third party maintenance and license agreements.

1.4.2.1.10.3 The contractor shall ensure that all IT systems are functionally and operationally performing at the lowest possible operating cost and in accordance with NASA requirements, including safety and schedules; industry best practices; and applicable standards, such as ANSI (American National Standards Institute).

1.4.2.1.10.4 IT sustaining engineering shall minimize disruption to system availability during normal working hours. Most supported applications require no contingency staffing or procedures for outages during nonworking hours. The contractor shall coordinate and schedule changes that require production outages with the customer in advance of the outage. In the event the outage is an emergency, the contractor shall immediately notify the ISS CIO and shall provide continuous status of the progress and expected time of availability.

1.4.2.1.10.5 The contractor shall establish and conduct a preventive maintenance and operational readiness program as defined below to ensure that all identified systems are functioning within required specifications.

#### 1.4.2.1.10.5.1 Remedial Maintenance

The contractor shall repair or replace failed equipment and restore it to operating condition. The repair and restoration may involve the temporary replacement of the equipment with a like item to allow continuation of the provided service. When failed equipment cannot be removed, the repairs will be accomplished in a way that minimizes disruption of other operational activities. When repair of a specific item of equipment is not cost effective (when repair costs exceed one third of replacement costs), the contractor shall replace the equipment. For equipment used to meet mission requirements, immediately after being notified that equipment is out of service the contractor shall initiate repair and notify the ISS CIO.

#### 1.4.2.1.10.5.2 Maintenance Agreements and License Management

The contractor shall create, maintain, and implement plans and schedules for maintenance agreement and license management. For Government-funded renewals, the contractor shall inform the ISS CIO a minimum of 90 days prior to expiration of agreements.

#### 1.4.2.1.10.5.3 COTS Maintenance

The contractor shall ensure defects in COTS products are fixed and version upgrades to COTS software are obtained. The contractor shall coordinate with the Government and application vendors. The contractor shall assess and implement each new patch or update to be applied for all supported platforms within 90 days of vendor release of the updates or patches. The contractor shall request a waiver if they find that a release or patch is incompatible with the current institutional environment, would impact data integrity or system stability, or would otherwise cause undue disruption to the user community. The contractor shall evaluate and update critical security patches within 24 hours of the patches being released by the vendor.

1.4.2.1.10.6 The contractor shall operate and provide system administration for all systems identified in Appendix E. System administration processes and procedures shall adhere to NASA and JSC policies and procedures. The contractor shall ensure that system administration support is provided within schedule guidelines. Operation and system administration shall include:

- ID administration and folder setup for access,
- Data transmission among systems,
- Creation/deletion of network printer queues,
- System backups,
- Virus scans,
- Problem identification and resolution,
- Technology upgrades.

1.4.2.1.10.6.1 The Contract shall provide Return to Service for IT systems as identified in Appendix E.

1.4.2.1.10.6.2 The Systems Administration functions (excluding facility, network outages, IT incident investigations, and maintenance service not under control of the contractor) shall be performed to minimize disruption to system availability, with the exception of scheduled outages.

1.4.2.1.10.6.3 The contractor's system administrators shall acquire IT security training in accordance with the JPG 2810.1, JSC Information Technology Security Handbook.

#### 1.4.2.1.10.7 IT Security Support

The contractor shall advise ISSP customers and users on IT security policies, provide technical representation to the Network Access Control Board (NACB) as required, implement approved firewall and networking solutions monitor production capabilities, and respond to requests for firewall and other IT security support by providing consultation and direct technical assistance to assist customers with the development of requirements for secure firewall and networking solutions.

1.4.2.1.10.7.1 The contractor shall maintain a knowledge base of security issues, problems, and resolutions.

1.4.2.1.10.7.2 The contractor shall perform periodic technical assessments, security testing of computer systems, and provide inputs to updates for JSC Computer Security Plans in support of NASA computer security officials.

1.4.2.1.10.7.3 The contractor shall process security-related incidents, including identifying network attacks (denial of service, viruses, worms, etc.), identifying and analyzing cases of misuse of IT resources, securing computing resources as required, and provide around the clock response to computer security incidents and notification of appropriate personnel.

1.4.2.1.10.7.4 The contractor shall provide analysis of security incidents relating to incorrectly configured systems, and work with system owners to properly reconfigure these systems.

1.4.2.1.10.7.5 The contractor shall provide real time incident status reports as required as soon as an incident is discovered. The contractor shall provide an incident report within 24 hours of any security or system configuration-related incident investigation being concluded.

#### **1.4.2.2 Work Authorization and User Support**

1.4.2.2.1 The contractor shall gather, organize, and disseminate IT information to the customer community in formats appropriate to the media. Subject matter content will vary but will always focus on keeping the ISSP community informed in a timely and accurate manner, providing them ready knowledge of products and services available, the mechanisms for acquiring those services, and information intended to help the customer. Services also entail reviewing and coordinating responses to e-mail traffic received in centralized electronic mailboxes intended for customer communication.

##### **1.4.2.2.2 User Requirements/Analysis**

(a) The contractor shall perform data gathering, entry, and analysis of requests to ensure that the customer requirement for products and services is documented and handled.

(b) The contractor shall document and coordinate implementation of IT requirements requested for implementation by the institutional and international IT providers.

(c) The contractor shall serve as the primary point of contact for IT services required to support end users.

##### **1.4.2.2.3 Loan Pool**

(a) The contractor shall serve as the primary point of contact for loan pool services required to support end users.

(b) The contractor shall develop and maintain user guides/desktop instructions for services that require user self-installation.

(c) The contractor shall provide procedures for appropriate property management of the ISSP loan pool products for check-in/check-out and regular inventorying.

(d) The contractor shall report property losses on an as occurred basis (as soon as possible).

(e) The contractor shall develop, implement, and maintain a standard load consistent with the approved JSC laptop load and any related policies and practices for the loan pool laptops.

(f) The contractor shall augment standard load configuration in order to support specific user requirements. Activities typical include configuration for tunneling, data transfers, and loading requested software.

1.4.2.2.4 The contractor will receive work authorizations via the Customer Service System, loan pool requests, and external access requests in addition to the IT project plans. The contractor shall ensure that its internal work management and tracking systems interface seamlessly with the Customer Service System for the purpose of receiving work authorizations and providing order status and tracking information.

1.4.2.2.5 The contractor shall track, resolve, and report on problems associated with systems, products, and services. Problem resolution includes accepting transferred calls from the various JSC Help Desks or ISSP Help Desks for systems under this contract and reporting resolutions back to the appropriate Help Desk. The contractor shall develop and maintain on-line problem reports.

1.4.2.2.6 The contractor shall provide desktop support services for ISSP IT not supported by other institutional providers. Desktop support are those services which support the users desktop environment; such as, but not limited to, loading/configuring local and network software, drivers, printers, peripherals, and data migration.

1.4.2.2.7 The contractor shall provide assistance in space utilization, coordination / facilitation, and planning for ISSP physical space requirements at JSC. This includes assessing requests, coordinating with the requestor(s), making recommendation, facilitating request through the implementing organization, tracking requirements through closure, and reporting.

## **1.5 INTERNATIONAL INTEGRATION**

### **1.5.1 RESERVED**

### **1.5.2 RESERVED**

### **1.5.3 IP Elements Integration Management (LOE)**

The contractor will perform the tasks identified below to support of IP Element Integration Management. For the purposes of this contract, "IP Elements" are defined as: JEM, CAM/CR, Columbus, Cupola, HTV, ATV, MSS, SPDM, SPP, MTsM, UDM, SM, DC, Soyuz, and Progress. The US will assume ownership of the CAM/CR and Cupola after the IPs have completed development and turned over possession of the element to NASA. All other IP elements will remain owned and be sustained by their respective IPs.

The NASA IP Element Integration Manager (EIM) provides overall management and oversight of the tasks that are necessary to integrate the IP Element into the ISS. The primary goal of IP Element Integration is to confirm the IP Element meets its ISSP requirements (e.g., system- and segment-level specifications, IRDs, ICDs) and is ready for flight. The IP EIM also ensures that NASA meets applicable ISS requirements in support of the integration of the IP Element and complies with bilateral agreements.

The Mission Integration, Cargo Integration, and Vehicle sustaining engineering teams provide the technical expertise and resources required to execute the tasks associated with IP Element integration (e.g., subsystem-level technical review of IP Element designs) and support the Element Integration Manager in performing the tasks necessary to integrate the IP Element and deliver on-orbit to the ISS.

### **1.5.3.1 Systems Engineering and Integration of IP Elements**

#### **1.5.3.1.1 Engineering Integration and Communication**

(a) The contractor shall work with the Program Data Integration team, which provides the book coordination function, to facilitate the technical development, coordination with IPs, management approval, and implementation of the following IP BDEALS documents: SSP 50124, NASA/CSA Bilateral Data Exchange Agreements, Lists and Schedules (BDEALS); SSP 50126, NASA/NASDA BDEALS; SSP 50127, NASA/ESA BDEALS; SSP 50137, NASA/RSA BDEALS; SSP 50407, NASA/ESA BDEALS for Cupola 1; SSP 50611, NASA/ESA BDEALS for ATV; SSP 50614, NASA/HTV BDEALS for HTV; and SSP 50617, NASA/NASDA BDEALS for CAM; and SSP 50352, NASA/AEB BDEALS. The data submittals provided by the IPs via these BDEALS documents will be made available as GFD to the contractor as defined in Appendix D, Table 2.

(b) The contractor shall work with the Mission Integration team, which provides the book coordination function, to facilitate the technical development, coordination with IPs, management approval, and implementation of the following IP BHSEALS documents: SSP 50136, NASA/RSA Bilateral Hardware and Software Agreements, List and Schedules (BHSEALS); SSP 50219, NASA/ASI Bilateral Hardware and Software Exchange Agreements, Lists, & Schedules (BHSEALS); SSP 50220, NASA/CSA Bilateral Hardware and Software Exchange Agreements, Lists and Schedules (BHSEALS); SSP 50264, NASA/NASDA BHSEALS; SSP 50289, NASA/ESA Bilateral Hardware and Software Exchange Agreements, Lists, and Schedules (BHSEALS); SSP 50408, NASA/ESA Bilateral Hardware and Software Exchange Agreements, Lists, and Schedules (BHSEALS) For Cupola; SSP 50615, NASA/NASDA BHSEALS for the H II Transfer Vehicle (HTV); SSP 50616, NASA/NASDA BHSEALS for the Centrifuge Element (Main Body); and SSP 50648, NASA/AEB BHSEALS.

(c) The contractor shall distribute Element technical, programmatic and operations data for review by ISSP teams identified in the IP Element Integration Team Lists.

- (d) The contractor shall collect assessments and comments to the above distributed Element data to ensure application of engineering and programmatic expertise in all aspects of the integration process: evaluation and definition of bilateral documentation, interfaces, requirements changes, exchanges of data and hardware/software, development and testing, special information requests.
- (e) The contractor shall facilitate ISSP teams communications with IPs and their contractors.
- (f) The contractor shall maintain cognizance and technical knowledge of Element design, associated issues, and planning and schedule status.
- (g) The contractor shall provide responses to communications and data requests from IP and ISSP teams in accordance with teams' schedules.
- (h) The contractor shall coordinate shipment of items to and from the IPs with the ISSP shipping coordinator in the Mission Integration team.

#### 1.5.3.1.2 Issue Resolution

The contractor shall coordinate issue resolution with the IP Element Integration teams as follows:

- (a) Collect information for issue definition and document integration and compatibility issues and actions.
- (b) Provide inputs to teams, and track issue resolution and action items closure for all phases of IP Element integration activities through on-orbit activation and checkout.
- (c) Develop proposals, assess risks and recommend schedule for technical issues resolution.
- (d) Chair technical forums, telecons and meetings required for issue resolution.
- (e) Provide regular technical status inputs to Action Items database for open actions;
- (f) Provide regular technical status inputs to Schedule management team;
- (g) Provide regular technical status inputs to NASA EIM; and
- (h) Provide regular technical status inputs to other teams, boards and panels in support of the EIM.

#### 1.5.3.1.3 Change Engineering

The contractor shall initiate CRs to maintain and update the ISS design and requirements baseline for IP Elements. The contractor shall perform Change Engineering functions for IP-related CRs and other activities necessary to maintain and update the ISS design and requirements baseline for IP Elements.

#### 1.5.3.1.4 IP Elements Acceptance and CoFR

The contractor shall support development, coordination and maintenance of the Program Integration office IP CoFR implementation plans. The contractor shall review and provide inputs to IP Element Acceptance Review Plans defined in DRD A-SA-06 for IP Elements for which NASA takes ownership and provide inputs to Assessment Review Plans for all other IP Elements. The contractor shall coordinate and implement the Acceptance Review Plans and Assessment Review Plans with IPs and within the ISSP.

### 1.5.3.2 IP Milestone Reviews

#### 1.5.3.2.1 Milestone Review Planning and Coordination

The contractor shall plan and track the ISSP teams' participation in the IP design, qualification, certification, and pre-shipment reviews to ensure compliance with ISSP requirements and policies. The contractor shall develop ISSP Support Plans for IP Milestone Reviews in accordance with DRD A-II-01. The contractor shall obtain concurrences for scheduling and support of the Milestone reviews from ISSP disciplines, teams and organizations and present for NASA approval. The contractor shall track the implementation of the approved ISSP Support Plan.

#### 1.5.3.2.2 IP Milestone Review Participation

The contractor shall participate in all stages of the Milestone Review, including:

- (a) Development of the Milestone Review Plan to be bilaterally concurred by NASA and the IP and post-review action closure.
- (b) Review of IP Design, Qualification and Certification Review data packages for compliance with ISSP requirements and policies defined in IP Elements Specifications, IRDs/ICDs and other applicable bilateral and multilateral documentation.
- (c) Identification and documentation of non-compliance issues.

### 1.5.3.3 ISS & Mission Integration

#### 1.5.3.3.1 Participation in ISSP Reviews

The contractor shall participate in the ISSP Milestone and Launch Package reviews identified in SSP 50200-02 and SSP 50489, ISS Mission Integration Template, by providing inputs to reviews and planning documentation. The contractor shall coordinate implementation of NASA Element team functions in support of these reviews.

#### 1.5.3.3.2 Launch Package and Increment Teams Support

The contractor shall provide consolidated Element team inputs to mission requirements, increment definition requirements, and manifest requirements for IP Element flights. The contractor shall review the IP Element applicable flight and increment documentation (e.g. IDRDs, manifest) and coordinate with the LPM and IM teams to ensure incorporation of these requirements. The contractor shall participate in LPM and IM teams negotiations of the requirements with the IP. For data that supports the IDRD PP development, the contractor shall provide inputs to the Mission Integration team via Requirements Request Forms as defined in SSP 50622-02. For data that supports the IP flight manifest development, the contractor shall provide inputs to the Mission Integration team via Manifest Requests as defined in SSP 50622-02.

#### 1.5.3.3.3 Element Ground Processing Coordination

The contractor shall coordinate with KSC and IP regarding IP Element hardware processing in the SSPF, to provide programmatic coordination including review of integrated IP Element schedules, status of Hardware processing, status of action items, and development and coordination of meeting agendas. After handover of the IP Element hardware to Shuttle Integration, the contractor shall support the Launch Package Management teams to coordinate element related processing issues.

#### 1.5.3.3.4 Element Flight Operations Support

The contractor shall coordinate with ISSP and IP Operations teams the planning and implementation of IP Elements flight operations, which includes participation in ISSP SIRs and review of the IP Element operations documentation, such as operational timelines, procedures and flight rules.

#### 1.5.3.3.5 Mission Support

##### 1.5.3.3.5.1 Increment Management Center (IMC) Support

The contractor shall staff the ISS Increment Management Center console during IP Elements assembly flights, flights involving CSA robotics missions, and first-time IP visiting vehicle flights (e.g. HTV & ATV) to provide a single point of contact for element team coordination and resolution of mission related issues on a real time basis. The contractor shall meet the process requirements identified in the ISS Management Center Operations Handbook (IMCOH.)

##### 1.5.3.3.5.2 Mission Evaluation Room (MER) Support

The contractor shall staff an ISS Mission Evaluation Room (MER) console during IP assembly flights, flights involving CSA robotics missions, and first-time IP visiting vehicle flights (e.g. HTV & ATV) to provide a single point of contact for Element team coordination and resolution of mission related issues on a real time basis. The contractor shall also staff an ISS MER console on an as-needed basis after the initial IP assembly flights and first-time IP visiting

vehicle flights to facilitate Element team coordination in resolving in-flight anomalies associated with the IP Element. The contractor shall meet the process requirements identified in OB-MER-006, ISS MER Handbook.

## **1.6 HUMAN SPACE FLIGHT COLLABORATION**

The contractor shall accomplish all work necessary to accommodate commercial customers to the ISS. The work will be the same or similar scope already required elsewhere in this contract SOW but will be performed in support of a NASA Reimbursable Space Act Agreement.

## **2.0 SYSTEMS ENGINEERING, ANALYSIS, AND INTEGRATION**

### **2.1 RESERVED**

### **2.2 SYSTEMS ANALYSIS AND INTEGRATION**

The contractor shall perform the tasks below in accomplishing ISS systems analysis and integration. The contractor shall use the coordinate systems defined in SSP 30219, ISS Reference Coordinate Systems Document, for analysis, products, or data that is produced for ISSP and requires the use of coordinate systems.

#### **2.2.1 Program Requirements and Interfaces**

##### **2.2.1.1 ISS Specifications and ICDs Maintenance**

- (a) The contractor shall provide book coordination functions for ISS Specifications, Interface Control Documents (ICDs), and Interface Requirements Document (IRDs) identified in Appendix H, in accordance with DRDs A-SI-01, A-SI-02, and A-SI-03. The contractor shall provide book coordination functions for SSP 30459, ISS Interface Control Plan, SSP 50135, ISS Interface Control Plan – NASA/RSA, and SSP 41174, ISS Interface Control Working Group (ICWG) Operating Procedures.
- (b) The contractor shall maintain the contents of the Master File for all Specifications and ICDs/Interface Requirements Documents (IRDs).
- (c) The contractor shall maintain tracking logs of Specifications, CRs and ICD/IRD revisions and history.
- (d) The contractor shall perform requirements traceability for SSP 41000, System Specification For The International Space Station; SSP 41160, ESA Segment Specification For Columbus; SSP 41162, Segment Specification For The United States On-Orbit Segment; SSP 41165, Segment Specification For The Japanese Experiment Module; SSP 50273, HTV Segment Specification; SSP 50312, CAM Segment Specification; SSP 50333, Cupola Segment Specification; and SSP 50439, ESA Segment Specification For The Automated Transfer Vehicle (ATV) in accordance with DRD A-SI-04 utilizing the Requirements Traceability Management (RTM) application identified in Appendix F, Table 1.
- (e) The contractor shall identify and track non-incorporated CRs to all retired, or no longer actively maintained, ISS specifications and ICDs.
- (f) The contractor shall review and evaluate ISSP changes to determine if those changes impact the documents supported in paragraph 2.2.1.1.a. When impacted, appropriate change description text shall be provided to the CM function.

##### **2.2.1.2 Coordination and Review of ISS Specifications, ICDs, and IRDs.**

(a) The contractor shall provide technical review of Specifications, ICDs, and IRDs identified in Appendix H during ISSP Milestone Reviews to ensure the requirements reflect the current ISSP baseline.

(b) The contractor shall provide technical review and coordination of Preliminary Interface Notices (PIRNs) for the documents identified in Appendix I and Document Change Notices (DCNs) for SSP 41150, IRD SSMB To Columbus APM; SSP 41151, IRD SSMB To JEM; SSP 41151-Appendix D, IRD SSMB To JEM, Appendix D; and SSP 41152, IRD ISPR ICD in accordance with SSP 30459, SSP 50135, and SSP 41174.

#### 2.2.1.3 ICWG

The contractor shall perform the following ICWG technical administrative functions in accordance with SSP 41174, SSP 30459, and SSP 50135.

2.2.1.3.1 The contractor shall maintain and update Hardware Interfaces Tracking System (HITS) database (or equivalent) identified in Appendix D, Table 1 to develop PIRNs status reports as follows:

(a) The contractor shall track and provide “ICD metrics” reports to include issue resolution plans on a monthly basis.

(b) The contractor shall track and provide “Element Manager Open PIRNs” reports on a weekly basis.

(c) The contractor shall track and provide reports identifying “TBDs” on a monthly basis.

(d) The contractor shall track and provide “Open Issues” reports on a monthly basis.

2.2.1.3.2 The contractor shall provide administrative support for Milestone Reviews to include: meeting logistics, administration, agenda preparation and distribution, action item tracking, meeting minutes preparation and archival of all presentation material related to ICWG products.

2.2.1.3.3 The contractor shall prepare, distribute, maintain and track Interface Memorandums to document official correspondence.

#### 2.2.1.3.4 PIRN and DCN Development and Maintenance

The contractor shall process and maintain ICD PIRNs and IRD DCNs as follows:

(a) The contractor shall prepare, distribute, process, maintain, and track Preliminary Interface Revision Notices (PIRNs) for the documents identified in Appendix I to update ICDs.

(b) The contractor shall prepare, distribute, process, maintain, and track Document Change Notices (DCNs) for SSP 41150, SSP 41151, SSP 41151-Appendix D, and SSP 41152 to update IRDs.

## **2.2.2 System Performance Analysis and Integration**

The contractor shall provide recommendations to the ISSP management on the strategic implications of the ISSP launch schedules, manifests, and ISS on-orbit operations, and assist in NASA's development of strategic requirements. To meet the full scope of this requirement, the contractor shall provide systems engineering and integration support for development of the ISSP strategic planning as described below, and shall report the results in accordance with DRD A-SI-05.

### **2.2.2.1 Mission Analysis and Integration**

#### **2.2.2.1.1 Attitude Requirements**

(a) The contractor shall develop, coordinate and obtain ISSP approval of the flight attitude requirements for the ISS operations. These requirements balance the needs of power, thermal, propellant, guidance, navigation, and control (GN&C) momentum management capability, micro-gravity, natural and induced environmental factors, communications, visiting vehicle, and other factors. The GFD tools Channelized Energy Balance Tool and Integrated Energy Balance Tool are available to support this function.

(b) The contractor shall input and maintain approved attitude requirements in the Space Station Certification Baseline Document (SSP 50699-03).

#### **2.2.2.1.2 Altitude Strategy**

The contractor shall develop and coordinate the ISS altitude strategy. The altitude strategy will include:

- analysis for inadvertent entry risk,
- projected on-orbit lifetime,
- ISS propellant availability,
- ISS propellant delivery requirements and capabilities,
- Micro-gravity environment,
- natural and induced environmental factors (including crew radiation exposure) as analyzed by NASA institutional resources and by the Vehicle sustaining engineering team
- launch vehicle performance.

Such analysis will also verify that ISS performs within hardware certifications, through consultation with the Vehicle sustaining engineering team and the Cargo Mission team.

The ISS Altitude Strategy is documented in SSP 50110, Multi-Increment Manifest Document and SSP 50112, Operations Summary Document and is implemented through the individual Increment Definition Requirements Document for each increment. If strategic conditions change after the base lining of the OSD, the contractor shall update the OSD and provide the applicable ISS Altitude Strategy data to the Mission Integration team via Requirement Request Forms as defined in SSP 50622-02, Section 4. The GFD tools TRAM, STRAP and Total Propellant Summary (TPS) are available to support this function.

2.2.2.1.3 The contractor shall integrate the rendezvous, proximity, and other special operations requirements and constraints (e.g.: contamination issues from liquid or gas venting) related to attitudes and system configurations for joint operations between the ISS and all ISS Visiting Vehicles, including but not limited to the Russian Progress and Soyuz, US Space Shuttle, ESA's Automated Transfer Vehicle (ATV) and the NASDA's H-II Transfer Vehicle (HTV). "Integrate" is defined as the coordination (between visiting vehicle providers and the ISSP) of requirements for attitudes for docking, undocking, and special operations, array and radiator positioning, resultant power balances, visiting vehicle power demands from the ISS, operations restrictions for contamination & structural loads, and other similar issues.

2.2.2.1.4 The contractor shall provide predictions for the ISS solar beta angle, based on the ISS altitude strategy and atmospheric variations bounded by the MSFC 5% and 95% atmospheres. In addition the contractor shall develop and maintain the BASEPLATE report using the atmospheric variation bounded by the Russian Planning Atmosphere.

2.2.2.1.5 The contractor shall develop, track, and maintain the strategic allocation of Vehicle technical resources, including establishment of program technical reserves of propellant, water, oxygen, and nitrogen.

2.2.2.1.5.1 Taking into account the strategic needs of the ISSP and the predicted flight sequence, the contractor shall coordinate projected water delivery and usage rates with ISSP suppliers and users of water, including the Vehicle sustaining engineering team and the ISS Payloads Integration team.

#### 2.2.2.1.6 Applications and Data Systems

The contractor shall maintain the applications identified below to support strategic planning and in response to differences or anomalies between the expected performance data and on-orbit performance data as provided by the Vehicle sustaining engineering team.

- Station Reboost Analysis Program (STRAP)
- Total Propellant Summary (TPS)
- Integrated Energy Balance Tool
- Channelized Energy Balance Tool
- External Configuration Tracking Tool (ExCATT)
- Traffic Resource Analysis Model (TRAM) or any upgraded traffic modeling tool
- Schedule of Crew Rotation, On-orbit Assembly, Logistics, and EVA (SCROALE)
- Sir Issue Tracking (SIT) database

## **2.2.2.2 Mission Requirements and Support**

2.2.2.2.1 The contractor shall provide strategic mission requirements, concepts, constraints, and resource allocations to the ISS Mission Integration team and NASA Mission Operations Directorate (MOD) to support development of mission planning, flight rules, and training.

### **2.2.2.2.2 Review of Operations Products**

(a) The contractor shall review (via ongoing technical interactions and reviews of change requests) the ISS operations plans and procedures to ensure that all ISSP strategic technical constraints are satisfied, such as equipment operating and non-operating thermal limits, time phased power generation and demands, fault tolerance and recovery capability, structural loads, control authority of the attitude control systems, and mechanical interferences.

(b) The contractor shall review crew procedures that are related to systems activation or rechannelization, or to environment interactions including (but not limited to) plasma, plumes, contamination, or meteoroid debris to ensure that all strategic technical constraints are satisfied.

(c) The contractor shall review flight rules to ensure that all strategic technical constraints are satisfied.

### **2.2.2.2.3 Stage Integration Reviews (SIRs)**

(a) The contractor shall coordinate the planning for and conduct the ISS SIRs as defined in SSP 50200-01, coordinating technical input from the Cargo Mission team, the Mission Integration team, the Vehicle sustaining engineering team, and other technical stakeholders. Such reviews are to be conducted no later than 18 months prior to an ISS assembly flight. Such reviews include detailed review plans and objectives published in advance to all participants. Such reviews include a Multi-Segment Operations (MSO) discussion, review, agreements and/or protocols between IP affected by the operations or plans during the assembly flight or stage operations covered during the SIR. The reviews shall include generation and closure of actions resulting from formal review of assembly and operations plan for each assembly flight and all pertinent ICDs.

(b) The contractor shall report to ISSP Management the issues and closure plans identified during SIRs.

2.2.2.2.4 The contractor shall provide technical support as needed to Mission Operations Directorate and to the ISSP through assessment of strategic ISSP (including International Partner and Participant) impacts during resolution of significant in-flight anomalies. Such support includes provision of technical assessments that individual specialists within the contractor's employ may be able to provide to the Mission Evaluation Room, working with the Vehicle Sustaining Engineering team on a temporary basis to resolve mission or life-critical issues.

## **2.2.2.3 System Analysis and Integration**

The contractor shall provide overall system analysis and integration of the ISS and associated interfaces, as described below, including: the United States On-Orbit Segment (USOS), International Partners and Participants (IP/Ps), GFE and ISS ground systems. This includes the ISS external interfaces, such as the ISS/National Space Transportation System (NSTS), other visiting vehicles, and the ISS/Payloads interfaces (does not penetrate beyond the interface to the Space Shuttle for the payloads).

2.2.2.3.1 The contractor shall facilitate and coordinate the development of ISS, Shuttle, and EVA operational procedures that ensure each external component's or payload's thermal survivability from launch to its activation on the ISS.

2.2.2.3.2 The contractor shall provide recommendations to ISSP management for approval in the development and prioritization of tasks performed by NASA institutional resources for the following analyses, as warranted by changing conditions or assumptions:

- Shuttle/ISS induced loads
- Plume heating analyses

2.2.2.3.3 The contractor shall develop and provide strategic assessments of ISS Thermal System Performance (TSP) throughout assembly phases and other significant ISS operations.

2.2.2.3.4 The contractor shall develop and provide heat load allocations for the ISSP end-user community, based upon active heat rejection margin analysis.

2.2.2.3.5 The contractor shall develop and provide power allocations for the ISSP end-user community, based upon Integrated Energy Balance margin analysis.

### **2.2.3 Assembly and Configuration Definition/Analysis**

The Assembly and Configuration Definition/ Analysis function provides the ISSP with long term flight and external configuration planning including the ISS assembly sequence, crew rotation plans, ISS external configuration, drawings, and Computer Aided Design (CAD) models for launch and on-orbit configurations.

#### **2.2.3.1 Assembly Sequence Analysis and Definition**

The NASA Assembly team function is responsible for the evaluation and integration of the total set of programmatic, schedule, technical, and cost factors impacting the Strategic Flight Program (SFP); document the resulting SFP requirements and constraints; and develop a flight plan in consideration of the aforementioned factors. The strategic flight planning activity includes all tasks associated with the definition of a viable assembly sequence.

The contractor will maintain a technical knowledge of the requirements, capabilities, and constraints and their interrelationships necessary to develop the Strategic Flight Program (SFP). The requirements, constraints, and allocations include:

- Up-mass and down-mass requirements and strategic mass and volume allocations for propellant, crew support (food, water, air, etc.), research, and maintenance;
- Capabilities and scheduling constraints of visiting vehicles that berth robotically or dock to the ISS vehicle;
- Top-level manifesting requirements and constraints of pressurized and unpressurized cargo carriers;
- Crew rotation requirements and constraints;
- Cargo element assembly and manifest requirements and constraints;
- Flight and increment EVA content, quantity, and scheduling constraints;
- Other operational requirements and constraints such as robotics, viewing, clearances, etc.;
- On-orbit vehicle assembly flows and the associated on-orbit hardware configuration for flight, intermediate, and stage configurations.

The detailed tasks necessary to implement the function described above are defined below.

2.2.3.1.1 The contractor shall develop and maintain the Integrated Flight Schedule (IFS) showing the baseline (per SSP 54100, IDRD Flight Program, and SSP 50110 ) and planned (as documented in open SSP 54100 and SSP 50110 ISSP CRs) launch, dock, undock and landing dates for all tactical and strategic flights to the ISS vehicle. This product documents the increment definition, durations and the baseline directive numbers.

2.2.3.1.2 The contractor shall develop and maintain the ISSP Crew Rotation Plan assessments in accordance with SSP 50261, Generic Ground Rules, Requirements, and Constraints Part I: Strategic and Tactical Planning document. The Crew Rotation Plan assessments trade the documented crew rotation requirements against mission manifest and operational impacts.

2.2.3.1.3 The contractor shall utilize the SCROALE (Schedule of Crew Rotation, On-orbit Assembly, Logistics, and EVA) or equivalent. The detailed SCROALE shall graphically shows the day-by-day timeline of all flights to ISS vehicle, Shuttle mission and increment EVAs (calling out Russian Segment and US Segment assembly, maintenance and science EVAs), launch and landing days (flight duration), dock and undock days (docked mission duration), robotics, Increment definition, Crew Rotation, and ISS vehicle major reconfigurations, including ISS assembly and visiting vehicle relocations. This product will assess the viability of the flight sequence plan and is developed in parallel with the baseline flight plan for the tactical and strategic timeframe. The contractor shall maintain a SCROALE for the baseline ISSP plan and perform trade studies of assembly sequence options under consideration. The contractor shall deliver the detailed SCROALE electronically. The contractor shall develop and maintain a summary Flight Program Figure that is an overview of the detailed SCROALE. The Flight Program Figure shall be capable of incorporation into Microsoft Word and PowerPoint.

2.2.3.1.4 The contractor shall maintain and update the Reference Assembly Sequence Overview. This product a combination of the tactical (as defined by SSP 54100) and strategic base lined assembly sequences (as defined by SSP 50110) that provides an integrated ISSP

schedule. This product also shows the proposed updates to all flights, which are contained, in open ISSP Change Requests (CRs) under review.

#### 2.2.3.1.5 Strategic Flight Program (SFP) Development

(a) The contractor shall collect requirements and constraints and develop a SFP implementing the requirements for ISSP approval. The contractor shall identify issues and requirement conflicts and develop options for ISSP resolution.

(b) SSP 50110 is the document that baselines the SFP. For Multi-Increment Manifest (MIM) development, the contractor shall collect inputs, develop the revised document, conduct document reviews, resolve technical issues and actions, prepare the ISSP Change Request (CR) and board presentations, and prepare the final document for approval. The MIM baselines the strategic assembly sequence, docking port utilization, crew rotation plan, flight schedule, top-level launch and return manifest, sub-element number, altitude, crew rotation, and launch vehicle.

(c) The contractor shall revise and maintain the Assembly Sequence Overview. This is the strategic assembly sequence that is sometimes developed prior to the MIM development or as part of an Interim Assembly Sequence update to the MIM.

2.2.3.1.6 The contractor shall coordinate and resolve issues and actions that impact the strategic assembly sequence manifest, configuration, and flight sequence that do not occur during the MIM development timeframe.

2.2.3.1.7 The contractor shall assess proposed tactical and strategic mission updates and identify issues and/or impacts to the SFP.

2.2.3.1.8 The contractor shall integrate the inputs and provide the ISSP approved Flight Overview Guidelines to the Mission Operations Directorate for development of Flight Overviews to support Stage Integration Reviews (SIRs), Multi-Segment Operations (MSO) Reviews, and SFP development.

2.2.3.1.9 The contractor shall provide the integration and coordination of strategic ISSP/SSP flight inputs to the Space Shuttle Program (SSP).

2.2.3.1.10 The contractor shall represent the Assembly and Configuration Team as a technical expert at boards and panels.

2.2.3.1.11 The contractor shall provide technical inputs and review assessments for other ISSP documents or reviews such as:

- SSP 50112;
- SSP 50261-01;
- Planning Period Increment Definition and Requirements Documents (PP IDRDs);
- SSP 50200-01 and SSP 50200-02;

- SSP 54100 FP;
- Flight Specific Data Files (PDRS/EVA and Rendezvous) for Flight Operations Review (FOR); and
- Post-Increment Evaluation Reports (PIERs).

### **2.2.3.2 External Configuration Analysis and Definition**

The NASA External Configuration team function is responsible for managing the definition and documentation of the integrated strategic and tactical external vehicle configuration plans and assessing any changes to the baseline. This responsibility includes working with the Vehicle sustaining engineering team which develop, validate and maintain detailed 3D CAD Models for launch and on-orbit stage docking configurations, develop the ISS System Top-Level Assembly drawings for each stage of the ISS vehicle and prepare, maintain, and submit engineering drawings.

2.2.3.2.1 The contractor shall maintain a technical understanding of the on-orbit vehicle assembly flows and the associated on-orbit hardware configuration for flight, intermediate, and stage configurations. The contractor shall also maintain a technical understanding of the assembly and configuration constraints necessary to manage the strategic, tactical, and real-time external Vehicle configuration.

2.2.3.2.2 The contractor shall assess, integrate, and coordinate requirements associated to the ISS external vehicle's configuration, including evaluating change requests that impact the external configuration for flight, intermediate, and/or stage configurations.

2.2.3.2.3 The contractor shall maintain and update SSP 50504, ISS Configuration Document and Assembly Matrix. The contractor shall collect inputs, develop the revised document, conduct document reviews, resolve technical issues and actions, prepare the ISSP Change Request (CR) and board presentations, and prepare the final document for approval.

The ISS Configuration document contains data describing how the ISS is assembled. The document also contains physical configuration data that is not captured elsewhere in the ISSP. The Multi-Increment Manifest provides the strategic assembly sequence and manifest. The IDRD Flight Program contains the tactical assembly sequence.

2.2.3.2.4 The contractor shall maintain and update SSP 30219, which documents the ISS reference coordinate systems for major elements and robotically handled items. The contractor shall collect inputs, develop the revised document, conduct document reviews, resolve technical issues and actions, prepare the ISSP Change Request (CR) and board presentations, and prepare the final document for approval.

### **2.2.3.2.5 CAD Model Development Support**

(a) The contractor shall participate in the CAD Model User Technical Interchange Meetings (TIMs) and the Measurement Technical Interchange Meetings (TIMs) hosted by the ISS Vehicle Segment Sustaining Contract. These TIMs determine which element and cargo element

components in the 3D CAD models, in the launch and on-orbit configurations, are validated to drawings and determine the required as-built measurements. The contractor shall provide inputs necessary to get validated and as-built CAD models.

(b) The contractor shall ensure that the external physical configuration data needed by the ISSP/SSP users is provided by working with the Vehicle sustaining engineering team to gather physical configuration data from detailed CAD models.

2.2.3.2.6 The contractor shall develop and gain concurrence of external configuration protocols with the International Partners and any other affected teams.

2.2.3.2.7 The contractor shall develop and review the mission-specific ISS/SSP On-Orbit Interface Control Document (ICD), Section 3, Physical Configuration for each Shuttle flight. The ISSP/SSP ICD documents the ISS and Shuttle data from the Orbiter rendezvous through the Orbiter departure. The blank book format is contained in NSTS-21000-IDD-ISS, Section S.3. The contractor shall update the Section S.3 blank book to incorporate the mission specific configuration data and figures.

2.2.3.2.8 The contractor shall develop and distribute the Vehicle Configuration Joint Working Group (JTWG) mission-specific vehicle configuration data sources letters to the ISSP/SSP community. These letters are produced at the L-9/10 months, in support of the SSP Cargo Integration Review (CIR), and L-4 months.

2.2.3.2.9 The contractor shall track the location of external configuration items. The contractor shall track the current and planned locations, as well as the historical hardware movement of needed configuration items such as external Logistics & Maintenance ORUs (spares stowed on orbit), EVA equipment/hardware, visiting vehicles, attach point utilization, standard and non-standard external stowage, utilization, and internal items that stowed externally.

2.2.3.2.10 The contractor shall utilize the External Configuration Analysis and Tracking Tool (ExCATT), or equivalent, and provide web-based reports accessible by the ISSP.

2.2.3.2.11 The contractor shall develop revisions of the On-orbit Assembly Modeling and Mass Properties Data Book (Blue Book) in accordance with DRD A-SI-06.

2.2.3.2.12 The contractor shall convert launch and return mass properties provided by the Vehicle sustaining engineering team to on-orbit mass properties for the development of the Blue Book.

2.2.3.2.13 The contractor shall review the Vehicle sustaining engineering team L-30 day delivery of pre-flight on-orbit ISSP mass properties prior to every ISS flight docking, undocking and redocking. The contractor shall coordinate and resolve issues due to mass properties differences between the L-30 day data delivery and the Blue Book.

2.2.3.2.14 The contractor shall perform ISS clearance and external stowage analysis using approved 3D CAD models.

2.2.3.2.15 The contractor shall perform clearance analysis for docking vehicles assessing the clearance of dynamic docking envelopes and verifying docking requirements.

2.2.3.2.16 The contractor shall develop and deliver simplified 3D CAD models to the RSC-E in .igs and .step formats. These models shall be delivered to other parties such as universities, NASA centers, other International Partners, and other commercial interests, as required. The files shall be delivered in the user's format using the contractor's 3D CAD tool capability.

2.2.3.2.17 The contractor shall perform 3D CAD model analysis to determine stowage of new or relocated external configuration items and determine any impact to follow-on assembly or flight activities.

2.2.3.2.18 The contractor shall provide electronic dimensioned and non-dimensioned hidden line or shaded drawings to support the development of ISSP documentation. These drawings shall be provided in .tif, .gif, and/or .pic formats.

2.2.3.2.19 The contractor shall collect and track mass properties of the cargo elements and ORUs for flights scheduled in the strategic timeframe.

2.2.3.2.20 The contractor shall provide launch vehicle ascent and descent weight assessments to support manifest assessments in the strategic timeframe.

### **2.2.3.3 Internal Volume Configuration (IVC)**

2.2.3.3.1 The contractor shall update and maintain Section 3.12, Interior Volume Configuration, of SSP 50261-01, Generic Ground rules, Requirements, and Constraints Part 1: Strategic and Tactical Planning (GGR&C Part 1). The contractor shall provide criteria for evaluating and prioritizing ISS internal volume demands in accordance with these requirements. Such criteria are put into practice in cooperation with the Internal Volume Configuration Working Group (IVCWG), Mission Integration team, and International Partners / Participants and in accordance with SSP 50005, ISS Flight Crew Integration Standards. Examples of such volume criteria include minimum IVA translation path clearance, worksite operational volumes, emergency module safing and crew health stabilization requirements, access to routine maintenance locations, and the clearance around air duct openings and utility outlets when selecting nominal on-orbit locations for ISS cargoes.

2.2.3.3.2 The contractor shall update and maintain the planned ISS IVA topology in SSP 50564, ISS Interior Volume Configuration Document, to include Vehicle, payloads, systems, racks and select GFE items. The contractor shall coordinate and provide modified topologies, as required, to allow for IVC studies due to changes to the ISS assembly sequence or changes to the ISS configuration.

2.2.3.3.3 The contractor shall develop and maintain a unified and validated 3D CAD model of the ISS interior, in accordance with DRD A-SI-07, to support graphic analysis of the ISS interior configuration at every stage documented in SSP 50564.

2.2.3.3.4 The contractor shall graphically analyze the acceptability of the ISS planned configurations based on the documented pass/fail criteria identified in SSP 50261-01. The contractor shall document the results, including any exception closures, and review with the IVCWG and the ISSP.

2.2.3.3.5 The contractor shall provide and maintain an IVC stage analysis verification plan via coordination of the ISS graphic analysis with the IP/P community and with the Mission Integration team and the IVCWG.

2.2.3.3.6 The contractor shall develop situation unique analyses, as required, to provide inputs to ISSP planning and issue resolution.

2.2.3.3.7 The contractor shall maintain the IVCWG website to record and communicate IVC activities to the NASA community.

2.2.3.3.8 The contractor shall participate in hardware design reviews to ensure identification and resolution of potential issues regarding design features that, if not resolved, would result in SSP 50261-01 IVC exceptions. This activity includes review of hardware design drawings, volume envelopes, and assessment of protrusions into the crew and/or other hardware operational volumes as defined in SSP 50261-01.

2.2.3.3.9 The contractor shall provide management and support to ISSP to maintain an ISS IVA physical environment integration function. This includes chairing the Internal Volume Configuration Working Group (IVCWG) and documenting the IVC Program processes.

## **2.2.4 Reserved**

## **2.2.5 Reserved**

## **2.2.6 Strategic Analysis & Integration**

2.2.6.1 The contractor shall perform ISS strategic studies by identifying issues and developing the technical strategic plans, resolution plans, and conducting necessary trade studies and analyses required for formulating recommended solutions to complex multidiscipline and programmatic issues.

2.2.6.2 The contractor shall maintain and update SSP 50112 and provide inputs to the specific Increment Definition and Requirements Document to establish strategic allocations of resources for operations planning. The contractor shall provide updates to the Mission Integration team for inclusion in the appropriate IDR/D via Requirements Request Forms as defined in SSP 50622-02, Section 4. Details of the contents of this task are outlined in subordinate paragraphs.

2.2.6.3 The contractor shall develop and provide launch vehicle ascent and descent strategic mass and volume allocations to the ISSP end-user community.

2.2.6.4 The contractor shall perform the ISS strategic resupply/logistics (traffic model) analyses, which are the integrated feasibility assessments to ensure strategic resupply, payload, and return cargo requirements using the planned international fleet of vehicles.

#### 2.2.6.5 Applications and Data Systems

The contractor shall maintain the applications identified below in response to differences or anomalies between the expected performance data and on-orbit performance data as provided by the Vehicle sustaining engineering team.

- Traffic Resource Analysis Model (TRAM).

### **3.0 SPACECRAFT**

### **3.1 RESERVED**

#### **3.1.1 Vehicle Management and Administration**

##### **3.1.1.1 Engineering and Technical Services (LOE)**

The contractor shall perform the following services to support the offices within the ISSP.

###### **3.1.1.1.1 Technical Integration Support**

###### **3.1.1.1.1.1 Meeting Support**

3.1.1.1.1.1.1 The contractor shall coordinate and schedule meetings and telecons for the ISSP Offices. The contractor shall coordinate meeting logistics, including:

- (a) scheduling conference rooms,
- (b) notifying attendees,
- (c) requesting interpretation and translation services,
- (d) requesting local transportation services for Russian Foreign Nationals, when necessary,
- (e) scheduling and set-up of equipment, and
- (f) preparation of meeting materials.

3.1.1.1.1.1.2 The contractor shall develop and distribute meeting agendas and minutes. The contractor shall submit the meeting minutes to the meeting chair for approval within 2 business days following the meeting.

3.1.1.1.1.1.3 The contractor shall maintain and track action items for each meeting and meeting series. The contractor shall capture any assigned actions items and the associated actionees and notify the actionees. The contractor shall document action closure and provide status and disposition of actions.

3.1.1.1.1.1.4 The contractor shall develop and maintain Points of Contact (POC) lists, distribution lists and team calendars of events. The contractor shall distribute event notifications, and other pertinent information.

###### **3.1.1.1.1.2 CoFR Process Support**

The contractor shall aid in the development of, and update, the specified Offices' Certification of Flight Readiness (CoFR) review plans and processes to reflect changes and process improvements. The contractor shall develop a mission-unique schedule of Office CoFR activities to support the ISS milestones. The contractor shall generate and maintain flight-specific checklists for implementation by Office technical personnel during the execution of the CoFR process.

The contractor shall support and implement the specified Offices' Certification of Flight Readiness (CoFR) review plans, reference SSP 50108, Certification of Flight Readiness Process Document for ISS. This shall include participation in all of the certification reviews (e.g., Station Cargo Certification Reviews (SCCR), Stage Operations Readiness Reviews (SORR), Acceptance Requirements Board (ARB) meetings, Launch Package Assessment (LPA) Reviews, and Flight Readiness Reviews).

The contractor shall serve as the Office CoFR custodian whose responsibilities include consolidating, organizing, and maintaining the Office's official CoFR records (i.e., presentations, endorsement packages, and all supporting back-up data). For the specified ISSP Offices, the contractor shall generate an integrated CoFR presentation with supporting subsystem and technical discipline data and compile endorsement packages.

#### 3.1.1.1.1.3 Program Review Support

(a) The contractor shall track and report open paper/actions in support of configuration audits, acceptance reviews, and other major ISSP milestones. The contractor shall collect all open actions, open VCNs, and open issues for each assigned element/end-item and provide a summary report of open items and their status for each review to support the ISS Program Office engineering acceptance of the end item.

(b) The contractor shall coordinate review of data packages, coordinate action item development and acquisition from the ISSP teams, and coordinate and track action item dispositions and closures. The contractor shall provide open action status during reviews. The contractor shall track action item status and closure. The contractor shall prepare in-brief and out-brief presentations for ISSP management.

#### 3.1.1.1.1.4 Coordinate Office CR Evaluations

The contractor shall serve as points of contact for Change Request (CR) processes and evaluations and manage the Office-specific CR review process including tracking of evaluations, comments and issues. The contractor shall facilitate processing of CRs originating from, or evaluated by, the Office. The contractor shall:

(a) identify appropriate Office evaluators and distribute the evaluation packages for internal review,

(b) contact evaluators to obtain status of their review and inform them of overdue evaluations,

(c) consolidate completed evaluations, comments, and issues and submit to the Office signatory for approval, and

(d) forward approved evaluation packages to CM Receipt Desk

#### 3.1.1.1.1.5 Office Metrics

The contractor shall gather specified data on a weekly basis to assist in the development of an integrated office metrics package for the specified Office for reporting to NASA management.

#### 3.1.1.1.1.6 Office Web Content

The contractor shall develop and maintain web page content for specified ISSP teams and offices. The contractor shall provide web site administration, web site design, and post new information to the websites. The contractor shall develop and provide web pages in accordance with the requirements and guidelines defined in Section 1.4, Information Technology.

#### 3.1.1.1.2 Engineering Services

##### 3.1.1.1.2.1 Issue Resolution

The contractor shall represent assigned functional areas at the ISSP boards and panels and provide reviews, assessments, and recommendations in resolution of issues. The contractor shall coordinate the resolution of system integration issues with the necessary subsystem and technical discipline teams within the ISSP.

##### 3.1.1.1.2.2 Engineering Evaluation and Integration

The contractor shall provide technical capabilities as requested to:

(a) recommend approval and acceptance of integration, operations, and system performance plans, procedures, analyses, tests, and reports,

(b) review documents, procedures, plans, and reports for discrepancies,

(c) provide assessments of the products to ensure they are in accordance with the program baseline, and

(d) perform impact assessments of ISS Change Requests against the program baseline.

##### 3.1.1.1.2.3 Integrated Test and Verification (IT&V) Support

The contractor shall develop, implement, and oversee IT&V products and processes as defined in D684-10020, ISS Program Master Integration and Verification Plan. The contractor shall support the development and maintenance, including the book coordination, of the following

Bilateral Integration and Verification Plans (BIVPs): SSP 50033, NASA/CSA Bilateral Integration and Verification Plan (BIVP), SSP 50034, NASA/ESA Bilateral Integration and Verification Plan (BIVP), SSP 50035, NASA/NASDA Bilateral Integration and Verification Plan (BIVP), SSP 50101, NASA/RSA Bilateral Integration and Verification Plan (BIVP), SSP 50102, NASA-ASI Bilateral Integration and Verification Plan (BIVP), SSP 50281, Node 2 NASA/ASI Bilateral Integration and Verification Plan (BIVP), SSP 50334, ESA/RSA Bilateral Integration and Verification Plan (BIVP) For ATV , SSP 50406, NASA/ESA Bilateral Integration & Verification Plan (BIVP) For Cupola , SSP 50420, NASA/NASDA Bilateral Integration & Verification Plan (BIVP) For HTV, and SSP 50544, NASA/NASDA Bilateral Integration & Verification Plan (BIVP) For CAM. Support to T&V shall include, but is not limited to, the following:

- (a) Coordination of ISS Specification, Section 4 requirements updates with subsystem teams and requirement owners.
- (b) Development, review, and issue resolution for the IT&V related specifications, Bilateral Integration and Verification Plans, and BDEALS. Support the definition, review, and approval of IP/P test requirements, plans, and closure criteria.
- (c) Development and approval of the IP/P requirements and test of the BIVP joint tests, integrated systems tests, and element leak tests.
- (d) Participation in Test Readiness Reviews and assessment of test readiness.
- (e) Generation of rationale pertaining to IT&V risk abatement.
- (f) Development, review, and approval of Operations and Maintenance Requirements and Specifications (OMRS) and Assembly, Checkout, Operations, Maintenance and Configuration (ACOMC) requirements used to document test requirements at KSC.
- (g) Coordination with subsystems teams and IP/P to achieve agreement on OMRS and ACOMC requirements definitions, test execution, requirements variances, changes, waivers, deviations, exceptions, interpretation agreements, and BIVP test sheets.
- (h) Assessment of BDEALS data deliveries and incorporation of VCM/VCD data into RTM/PVIS.
- (i) Review of verification data provided by IP/Ps to show that Specification section 3 requirements have been met or that appropriate waivers, deviations, or exceptions have been approved.
- (j) Incorporation of IP/P verification data into Stage VCNs for closure of ISS Stage and System requirements.

#### 3.1.1.1.2.4 Cable and Fluid Assessment

The contractor shall provide oversight of the cable and fluid assessment activities performed by the Vehicle sustaining engineering team. The contractor shall evaluate and audit test reports and procedures for compliance to ISS requirements and to the cable and fluid assessment detailed verification objectives (DVOs) and verification logic network (VLN). These DVOs/VLNs address the set of cable and fluid assessment activities including Design Audits, Physical (As-Built) Audits, Mate/Fit-checks, and On-Orbit Constraint Tests for extra-vehicular activity and intra-vehicular activity. The contractor shall assist NASA in coordinating test and audit activities with the IP/Participants. The contractor shall recommend approval of the Verification Closure Notice (VCN) in support of CoFR.

#### 3.1.1.1.2.5 Project Management Support

The contractor shall support the development of hardware and software systems by providing project management support to ensure that ISSP needs are met; these needs include technical, cost, and schedule requirements. The contractor shall ensure that assigned projects are developed in accordance with ISSP processes. The contractor shall produce project documentation as requested. The contractor shall evaluate and track development issues and schedule issues from project inception through initial flight of the hardware/software system. The contractor shall work closure of technical and schedule issues with the hardware/software providers. The contractor shall coordinate processes and lead issue resolutions between the provider organizations, launch integration organizations, and the ISSP. The contractor shall identify threats to key milestone completions and corresponding ISSP impacts. The contractor shall prepare a weekly status report of technical issues and schedule compliance. The contractor shall assist with risk management, including the coordination of budget, schedule, metrics, risks associated with individual development projects, and the rollup and trend analysis associated with the set of all development projects.

#### 3.1.1.1.2.6 Hardware Delivery Support

The contractor shall support NASA in the acceptance of hardware purchased through the Vehicle sustaining engineering team and hardware purchased under other contracts for the External Carriers Office. Tasks shall include providing concurrence for certification and DD250 prior to shipment of hardware to the flight preparation facility (typically KSC), monitoring and participating in schedule and manufacturing reviews related to the delivery schedule of hardware, and participating in design and requirement reviews to ensure that hardware needs to support ISS carriers are properly identified. The contractor shall maintain a database to track all hardware deliverables between the ISSP and its contractors that support ISS carriers. The contractor shall review ISSP CRs involving ISS carriers to ensure that equipment requirements are properly identified and meet ISSP requirements.

The contractor shall coordinate deliveries of Government Furnished Equipment, including hardware supplied by the JSC EVA Projects Office, and ensure that deliveries meet manufacturing, assembly, and test schedules. The contractor shall implement requests and justify needs for EVA hardware deliveries to support ISS carriers.

#### 3.1.1.1.2.7 Book Coordination Support

The contractor shall provide Book Coordinator functions to support the NASA Book Managers in the development and maintenance of assigned documentation. This support includes:

- (a) coordinating inputs and tracking communications from the International Partners regarding the documents.
- (b) coordinating and conducting meetings to evaluate the changes, documenting and distributing the minutes and actions, and tracking action closures.
- (c) developing and making presentations to the appropriate control board/panel as required to obtain approvals for document release.

#### 3.1.1.1.3 Special Studies

The contractor shall conduct special studies within the scope of the PI&C SOW as requested. The scope of the study, products, and schedule will be defined in a LOE task order.

**4.0 RESERVED**

**5.0 RESERVED**

## **6.0 SAFETY AND MISSION ASSURANCE (S&MA)**

The Agency Safety Initiative establishes the NASA safety hierarchy, which is the order NASA will use to prioritize its safety efforts. The safety hierarchy is as follows:

- (a) **Safety for the public** - NASA absolutely must protect the public from harm.
- (b) **Safety for astronauts and pilots** - NASA has to protect them as they expose themselves to risk in high hazard flight regimes.
- (c) **Safety for NASA workforce** - NASA is responsible for providing a safe and healthful workplace.
- (d) **Safety for high-value equipment and property** - NASA is a steward of the public's trust.

By focusing on the safety of NASA's mission and operations, NASA will improve quality and decrease cost and schedule.

### **6.1 S&MA MANAGEMENT AND ADMINISTRATION**

#### **6.1.1 Mission Assurance and Risk Management (MA&RM) Plan**

The contractor shall develop, maintain, and implement the Mission Assurance and Risk Management (MA&RM) Plan in accordance with DRD A-SA-01.

#### **6.1.2 Quality Management System**

The contractor shall establish and maintain a Quality Management System (QMS) that complies with AS9100. Third party certification/registration is not required. If the contractor is AS9100 registered and subsequently changes registrars, loses registration status, or is put on notice of losing registration status, the contractor shall notify the NASA Contracting Officer within three (3) days of receiving such notice from the registrar.

The contractor shall maintain the ISSP S&MA quality records system in accordance with SSP 41173 and AS9100.

#### **6.1.3 Audit/Surveillance**

The contractor shall provide access to data, personnel, and facilities for government audit/surveillance of the contractor's plans, procedures, and processes when deemed necessary by the Government. The contractor shall provide written responses to audit/surveillance findings that are delivered to and accepted by the government.

#### **6.1.4 Safety and Health**

The contractor shall develop and implement a process to identify how personnel and property will be protected from injury or harm and ensure the safety of all working conditions throughout the performance of the contract. The process shall provide for hazardous operation surveillance, hazardous procedure review, and risk assessments associated with deviations from procedures or safety and health requirements. The contractor shall comply with NASA-Installation safety and health requirements and related processes when performing contractor work onsite at NASA installations. The contractor shall develop, implement and maintain a Safety and Health (S&H) Plan in accordance with DRD A-SA-02. Upon approval, the S&H Plan shall be incorporated into the contract as Attachment J-5. The contractor shall document the assessments in monthly safety and health metrics in accordance with DRD A-SA-03 and perform an annual Safety and Health Self-Evaluation in accordance with DRD A-SA-04.

##### **6.1.4.1 Mishap Investigating and Reporting**

(a) The contractor shall investigate and report mishaps, in accordance with NPG 8621.1, NASA Procedures and Guidelines for Mishap Reporting, Investigating, and Record keeping, and NPG 8715.3, NASA Safety Manual. All investigation reports shall include a human factors assessment, root cause analysis and any remedial/corrective actions performed. These reports shall encompass mishaps occurring during the contracted period as follows:

- All mission failures and type A and B mishaps resulting in injury to contractor personnel or equipment damage occurring onsite at NASA facilities and offsite at contractor facilities.
- Type C mishaps resulting in equipment damage onsite at NASA facilities and offsite at contractor facilities.
- Type C mishaps resulting in injury to contractor personnel located onsite at NASA facilities.
- Incidents and close calls occurring onsite at NASA facilities.

(b) The contractor shall develop and implement a call tree with government contacts for the reporting of a mishap, near-miss incident, equipment problem or a system going out of specification. The contractor shall use the call tree to report incidents and problems within four hours of the occurrence. Type C injury mishaps occurring offsite at contractor facilities shall be reported in a monthly summary of such injuries.

(c) The contractor shall enter mishap reporting and provide summary data into the Incident Reporting Information System (IRIS) per NPG 8621.1.

#### **6.1.5 Lessons Learned**

The contractor shall participate in the Lessons Learned Process where appropriate. The contractor shall enter the lessons learned into the government provided Lessons Learned Information System (LLIS) per AG-CWI-001.

## **6.2 INTERNATIONAL PARTNERS/PARTICIPANTS S&MA INTEGRATION**

### **6.2.1 IP Technical Integration**

(a) The contractor shall perform S&MA technical integration in accordance with the IP bilateral agreements of IP Elements, visiting vehicles, cargo, and payloads, including participation in Safety Reviews, Milestone Reviews and TIMs. Technical integration includes participating in the identification and resolution of technical issues affecting S&MA, receiving and distributing S&MA data between NASA and IPs, tracking of open issues and actions resulting from the Milestone Reviews and TIMs that impact the safety, reliability, and quality assurance aspects for each flight and supplying the data to the Mission Integration team.

(b) The contractor shall periodically status S&MA issues and open action items for the IP Elements, vehicles, cargo and payloads to ISSP boards and panels.

The contractor shall coordinate reporting and ensure dispositioning and reporting of applicable problems by the International Partners/Participants (IP/P) representatives in support of NASA in the implementation of bilateral agreements, and in accordance with the ISS Problem Reporting and Corrective Actions process and maintenance (SSP 30524 and SSP 30223).

The contractor shall evaluate change requests, participate in the development of requirements and processes and support working groups, telecoms and Certificate of Flight Readiness activities.

### **6.2.2 Joint American/Russian Safety Working Group (JARSWG) Administration Support**

The contractor shall prepare agendas, minutes and protocols, as appropriate, for JARSWG telecoms, TIMs, meetings, letters of invitation, logistics and interpreters.

The contractor shall coordinate interpretation and translation support for JARSWG meetings and faxes.

### **6.2.3 Document Maintenance**

The contractor shall provide book coordination functions for the following ISSP S&MA documents:

- SSP 50062
- SSP 50145
- SSP 50146
- SSP 50182
- SSP 50191
- SSP 50346

- SSP 50428

## **6.3 PROGRAM RISK**

### **6.3.1 Management of Risk Process**

The contractor shall maintain the risk management process and the Integrated Risk Management Application (IRMA) in accordance with SSP 50175, ISS Risk Management Plan, JPD 306, and NPG 8000.4. This will include ensuring the integration of all data and data integrity of the Risk Management Database and associated linkage with the MIS for identification of risks assigned tasks.

The contractor shall identify S&MA risks and provide input to the risk process utilizing the Integrated Risk Management Application (IRMA) in accordance with SSP 50175 and JPD 306 as well as coordinate risks with NASA counterparts.

The contractor shall provide the necessary training and tools to the appropriate employees to affectively identify threats and possible risks to successful completion of the mission.

The contractor shall facilitate any ISSP S&MA corrective action/preventative action responses in accordance with JPD 328, including coordinating responses and entering updates into the JSC Quality Process Improvement Database. The process requires the identification and mitigation of adverse trends, potential events, or significant anomalies that may adversely affect multiple programs, projects, or divisions.

The contractor shall coordinate risks in support of risk advisory boards in accordance with JPD 306 and SSP 50175.

### **6.3.2 Probabilistic Risk Assessment (PRA)**

The contractor shall perform the PRA modeling and trade studies in accordance with NPG 8705, PRA Guidelines for NASA Programs and Projects. Modeling and trade studies may include the ISS and any visiting vehicle, including those that are in a conceptual design phase. The contractor shall use SAPHIRE PRA modeling/development application identified in Appendix F, Table 2.

The contractor shall develop a PRA process capable of tracking the safety of flight issues through program maturity in accordance with DRD A-SA-05.

The contractor shall perform trade and sensitivity analyses using the Probabilistic Risk Assessment and make recommendations as appropriate. Trade studies and analyses will include (i) background on problem, (ii) assumptions and constraints, (iii) scope of analysis, (iv) methodology, (v) detailed analysis and results, and (vi) conclusion.

The contractor shall identify and disclose as appropriate any instance of a detected disconnect or flaw regarding the connectivity of the Government supplied hazard analysis, failure modes and effects analysis, or other engineering data which leads to the identification of an unidentified catastrophic hazard.

### **6.3.3 Document Maintenance**

The contractor shall provide book coordination functions for the following ISSP S&MA documents:

- JPD 306
- SSP 50175

## **6.4 ISS SAFETY PROGRAM**

In support of the Certificate of Flight Readiness (paragraph 6.2.3), the contractor shall develop safety assessments in accordance with Safety and Risk Assessment Requirements Document (SSP 30309), and hazard reports in accordance with Hazard Reports and System Description (DRD A-SA-07). Safety assessments and hazard reports shall include actual and/or planned cable, hose and duct drag-throughs; IVA hardware and/or cargo stowage; and internal volume configuration. . [NTN-011, IVA related STO-0801 and Operational causes (1, 3, 7, 10 & 11) for IVA-0201.]

The contractor shall obtain program approval in accordance with the Safety Review Process (SSP 30599). This requires supporting the appropriate Safety Review Panels, ISS Boards and Panels, teleconferences and Working Groups.

### **6.5 RESERVED**

## **6.6 QUALITY ASSURANCE**

### **6.6.1 Problem Reporting System Maintenance**

The contractor shall maintain the ISS Program Reporting and Corrective Actions (PRACA) process and database in accordance with SSP 30524 and SSP 30223. This activity includes the coordination of the PRACA process with the problem resolution teams to facilitate issue resolution.

### **6.6.2 Element Hardware / Software Acceptance**

(a) The contractor shall develop, maintain, and implement an IP Element Acceptance Review Plan as defined in DRD A-SA-06 and in accordance with bilateral agreements for the CAM/CR.

(b) The contractor shall report on Acceptance Review audits of deliverable hardware and software to ensure compliance with bilateral agreements. The contractor shall track open RIDs and/or action items to satisfactory closures.

### **6.6.3 Documentation Maintenance**

The contractor shall provide book coordination functions for the following ISSP S&MA documents:

- JPD 328
- JPD 315
- SSP 30223
- SSP 30524
- SSP 30695
- SSP 41173
- SSP 50190
- SSP 50200
- SSP 50287

## **6.7 OPERATIONS SAFETY**

The contractor shall perform Operations Safety in support of S&MA Integration (paragraph 6.2) and ISS Safety Program (paragraph 6.4).

### **6.7.1 Documentation Verification**

For all flights, the contractor shall perform flight and/or stage specific integrated safety assessments for Mission Integration in accordance with ISS safety requirements of the Generic Ground Rules and Constraints (GGR&C, SSP 50261-01 and -02), Safety Requirements Document (SSP 50021), and Safety Analysis and Risk Assessment Requirements Document (SSP 30309) and Flight Rules. In addition to the requirements of paragraph 6.4, the safety assessments shall also focus on manifest priorities and documentation (hazard toxicity and safety certification), increments, mission templates and planning periods.

### **6.7.2 Mission Integration and Operations Planning**

The contractor shall provide products and services in the development of ISS requirements, operations, and mission plans for integrated ISS Program increments, flights, stages and generic planning.

The contractor shall participate in the strategic and tactical planning activities and ensure that safety, mission success and potential risks are included in the development of planning periods, increments, flights, and/or stage requirements. The contractor shall provide representation at the

appropriate ISSP level boards, panels, and working groups which address generic requirements for strategic and tactical planning.

The contractor shall provide safety participation during the programmatic planning and development of ISS Program generic requirements for the overall tactical and strategic plan development. Planning Period concentrates on generic requirements development and issues crossing Planning Periods, Increments, etc.

**TABLE 6.7.H-1 ADDITIONAL RESOURCE DOCUMENTS**

#	Document #	Document Title
1	SSP 50200-xx	SPIP documents (specifically documents Volume 1, 2, and 8)
2	SSP 50489	Mission Integration Templates
3	SSP 50261-01	Generic Groundrules, Requirements, and Constraints Part 1: Strategic and Tactical Planning
4	SSP 50261-02	Generic Groundrules and Constraints Part 2: Execute Planning
5	SSP 50021	Safety Requirements Document
6	SSP 50005	ISS Flight Crew Integration Standard (NASA-STD-3000/T)
7	SSP 41000 Series	System Specifications for the ISS
8	SSP 50562	ISS Program Off-Nominal Situation Plan
9	SSP 54100	IDRD Flight Program
10	SSP 50448	Station Development Test Objectives

### **6.7.3 Increment Management Team Representative**

As a member of the Increment Management Team (IMT), the representation actively participates to ensure IDRDs and their annexes are developed to include safety requirements. Identify safety issues and closure recommendations. Negotiate with the ISS Program community on IDRD task requirements, priorities. Manifests are developed per established GGR&C requirements specifying safety first to support the Increment. Develop special assessments as necessary. Provide an integrated ISS S&MA status, resolution and/or disposition to the IMT on safety-related issues and IDRD CRs.

Provide safety requirements for implementation into increments, flights, and stages to support increment activities function. Manage technical coordination of assessments, inputs, and documents.

### **6.7.4 Launch Package Management Team Representative**

As a member of the Launch Package Management (LPM) Team, actively participate to ensure Flight IDRDs and sub-products (annexes, etc.) are developed to include safety requirements and

priorities; identification of safety issues and closure recommendations; negotiation with the ISSP community; special assessments, integration of safety-related issues.

#### **6.7.5. ISSP Change Requests**

The contractor shall coordinate and facilitate S&MA change requests. The contractor shall evaluate change requests for S&MA impacts, complete the needed evaluation forms and make any needed presentation material and presentations, if required, to the various boards, panels and teams.

The contractor shall review Mission Integration and Operations' plans, OSCARs, manifests and flight planning change requests and participate in change request meetings as needed.

#### **6.7.6 Document Maintenance**

The contractor shall provide book coordination functions for the following ISSP S&MA documents:

- SSP 30234
- SSP 30309
- SSP 30599
- SSP 50021
- SSP 50038
- SSP 50145
- SSP 50231